AVIATION WEEK

MAR. 22, 1954

50 CENTS

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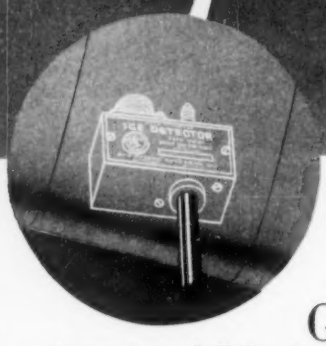
FIRST FULLY AUTOMATIC SYSTEM OF ICE DETECTION AND ICE CONTROL FOR EVERY TYPE OF AIRCRAFT!



GOODYEAR ANNOUNCES
the Automatic Iceguard System*

GUARDIAN outpost of the new system is the ice-sensing probe accurately flashing its ice-warning and all-clear signals to the central control unit—the "brain" which directs the on-heat, off-heat action of Goodyear's famed Iceguards, on wing and empennage surfaces.

Precious seconds before a pilot's eye could detect ice or his finger flick a switch, the operation of the Automatic Iceguard System is in full swing.

A new era of safer automatic all-weather flying is introduced by this new electrothermal ice-protection system—developed in conjunction with the National Research Council of Canada – a Goodyear exclusive in the United States.

Proved and already standard equipment on Canada's Canuck CF100 fighters, the automatic detection and control unit is easily installed—and has a total weight of only 11 pounds, 10 ounces!

It is available for your aircraft now. FOR COMPLETE DETAILS, WIRE OR WRITE: Goodyear, Aviation Products Division, Akron 16, Ohio or Los Angeles 54, California.

Iceguard—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR AVIATION PRODUCTS

The ice-detection device can be used separately for warning of icing conditions.

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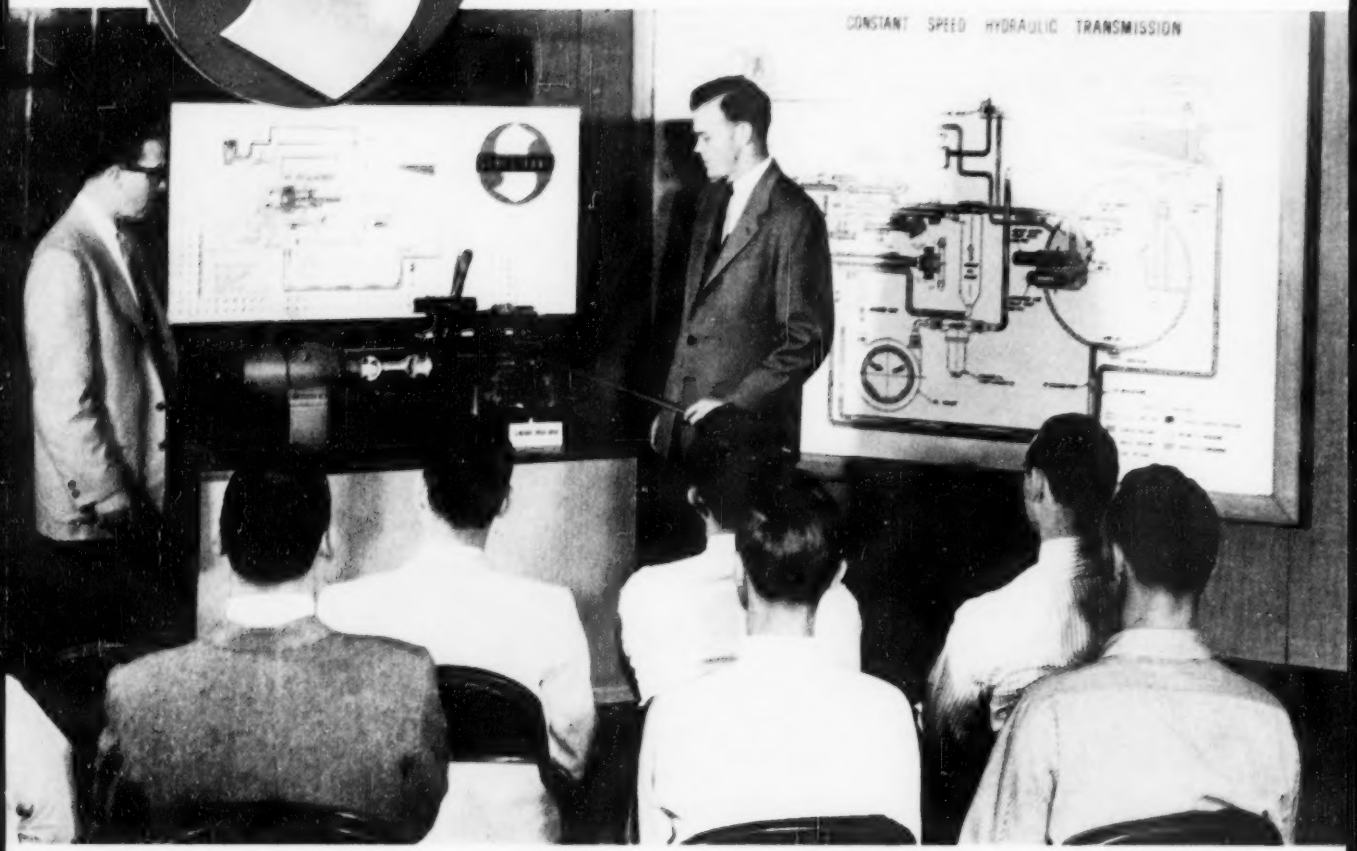
How you get 5-way service on Sundstrand Drives...



Established in 1951, the Sundstrand Aircraft Service Corporation has developed a well-trained technical organization with a steadily growing staff of competent, specialized engineers. These men, versed in both electrical and engine requirements of modern aircraft, handle these five important functions dealing with the application, operation, and maintenance of Sundstrand Constant Speed Drives:

(1) Technical advice and assistance on initial installations. (2) Provision of instructional materials for system familiarization. (3) Technical instructions of customer and flight personnel. (4) Provision of close liaison between Sundstrand, the Air Force, BuAer, and engine and airframe manufacturers. (5) On-the-spot technical assistance to maintenance personnel.

Because of the rapidly increasing use of Sundstrand Constant Speed Drives, today you will find these experienced consultants in far-flung Air Force Bases, Naval Air Stations, and plants of major airframe and engine manufacturers. Call on them—they represent another Sundstrand contribution to the aviation industry.

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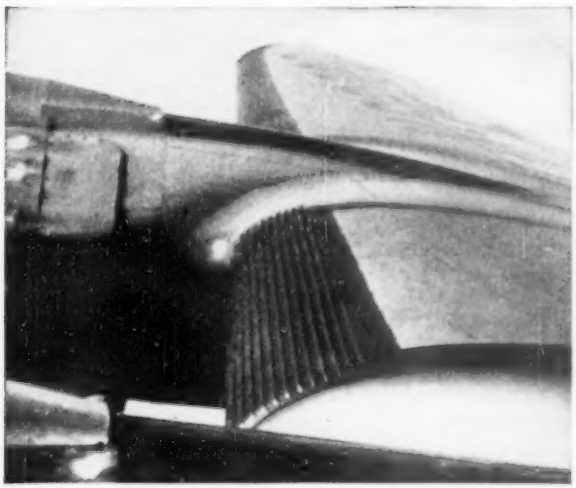

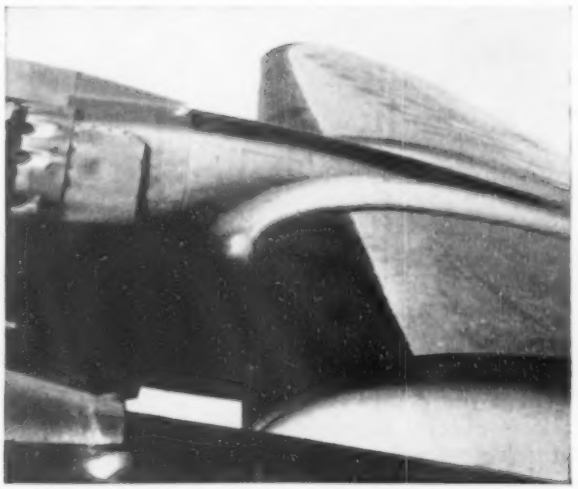

Makes removing ice a snap

THE WINGS of TWA's new Super Constellations, like the one in the top photo, are safely protected against ice with a new kind of B. F. Goodrich De-Icer. Dozens of small tubes running along the wings inflate (see bottom left photo) and deflate (see bottom right photo) to snap off ice so the airstream can carry it away.

The small tubes operate faster and with almost three times the air pressure than those used in ordinary wide-tube De-Icers. This quicker action snaps ice off faster and cleaner.

Airlines report the new B. F. Goodrich De-Icer lasts longer, too. That's because they're made to fit and simply cemented onto the leading edges. No mechanical attachments, no stretching, no tension. The new BFG De-Icers are lighter and take up little space for plumbing.

The new De-Icer is used on all the new Super Constellations. It's one more development for the aviation industry from B. F. Goodrich, leader in rubber research and engineering. Other B. F. Goodrich aviation products: tires, wheels and brakes; heated rubber; Pressure Sealing Zippers· Avtrim; fuel cells, inflatable seals, Rivnuts; hose and other accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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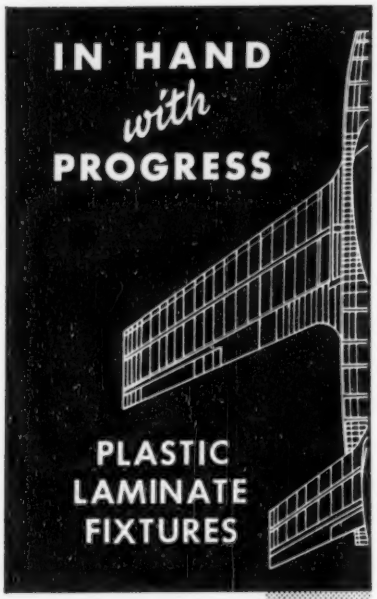

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Aviation Week

March 22, 1954 Vol. 60, No. 12

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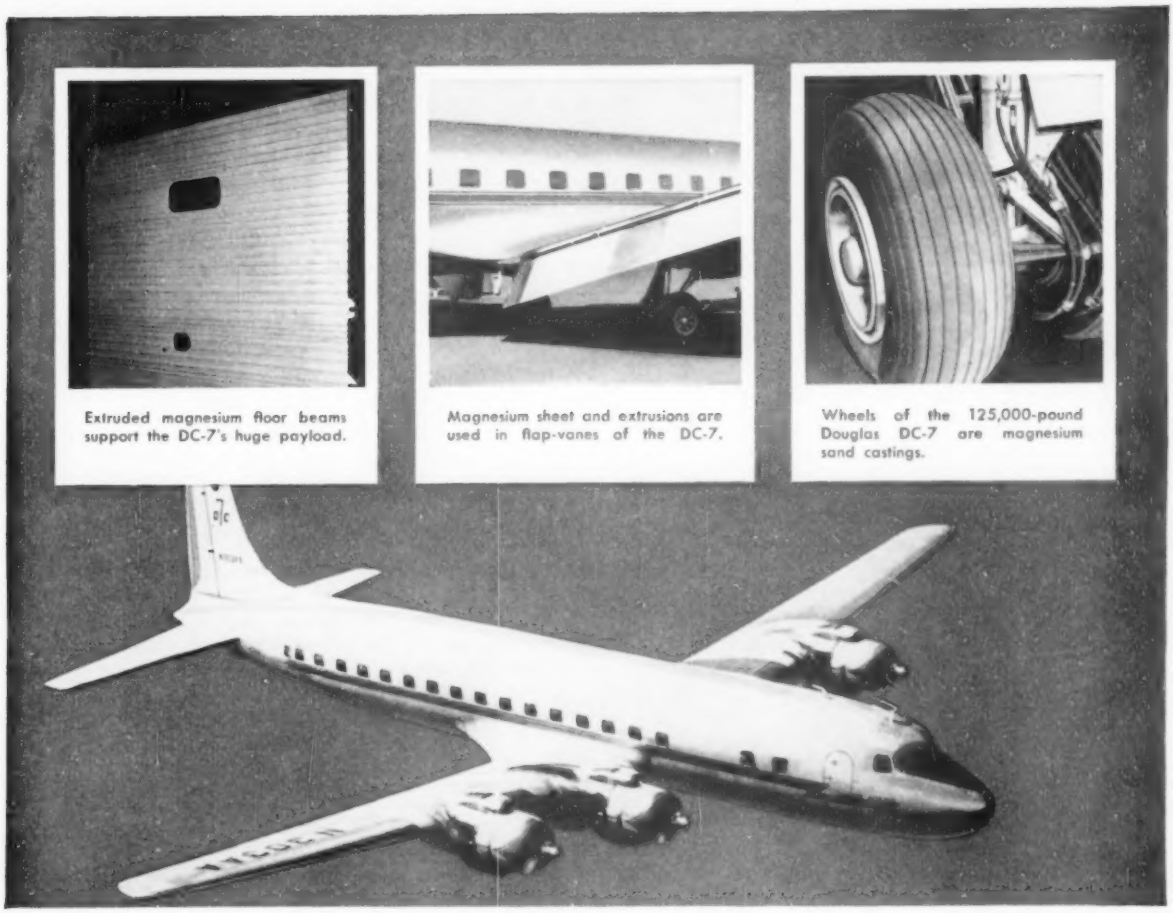
DOW



Extruded magnesium floor beams support the DC-7's huge payload.

Magnesium sheet and extrusions are used in flap-vanes of the DC-7.

Wheels of the 125,000-pound Douglas DC-7 are magnesium sand castings.

Douglas DC-7 gains extra payload capacity from magnesium castings, extrusions and sheet

As the world's lightest structural metal, magnesium's growing place in military aircraft is now well established.

Designers of commercial planes are now taking advantage of magnesium's exceptionally high strength-weight ratio. The luxurious Douglas DC-7, for example, depends on magnesium for such vital components as wheels, flap-vanes, floor beams and many others. Magnesium castings, extrusions and sheet are used in this fastest piston-powered commercial airliner.

Magnesium lends itself readily to all ordinary methods of working and fabrication. Leading aircraft manufacturers who now incorporate it in some of their finest products include Boeing, Convair, Sikorsky, Chance Vought and Douglas, among others. Magnesium may solve a strength-weight problem for you. For full information, call your nearest Dow sales office or write directly to THE DOW CHEMICAL COMPANY, Magnesium Department, Midland, Michigan, MA 310H.

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DOW

LOOK no ice!

It's protected with "warm-wing" controls manufactured by UCC*

NEITHER glaze ice, rime nor frost can keep Boeing jet bombers from carrying out their missions.

A new thermal anti-icing control system, developed and manufactured by United Control Corporation, now is standard equipment on Boeing jets.

Wing, tail and engine-nacelle surfaces are kept at constant ice-proof temperature levels, regardless of ambient conditions, because this control system *operates on skin temperature.*

By flush-mounting UCC sensing elements in the anti-iced surfaces, the skin of the aircraft becomes the source for control signals regulating heat delivery.

UCC's control system is . . .

- AUTOMATIC—Pilot has only to turn the system on.
- LIGHT WEIGHT—Controls required to anti-ice the wing of a jet bomber weigh less than five pounds.
- SAFE—Over-heat danger is eliminated by continuous checks maintained on skin and structure temperatures.
- EFFICIENT—System operates on demand, so no fuel is wasted. No exterior equipment increases drag or reduces wing lift.

UCC thermal anti-icing controls can be adapted for use on all types of aircraft. If you are faced with an ice-protection problem, take advantage of United Control Corporation's experience in producing *flight-proven* anti-icing controls.

(UCC also produces compartment air conditioning controls for aircraft. Write today for Technical Bulletin 401.)

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Fuel-Level Float Switches • Warning-Light Dimming Controls • Standard Regulators • Thermal Switches

NEWS DIGEST

Domestic

Link Aviation, Inc., will be sold to General Precision Equipment Corp., New York, under a preliminary purchase agreement signed by GPE with stockholders of the Buffalo, N. Y., producer of flight training devices. GPE officials say Link will continue to operate under its present management but will be set up as a wholly owned subsidiary of the New York company.

Charles S. Thomas, Assistant Defense Secretary, onetime director of Lockheed Aircraft Corp. and World War II special assistant to the Assistant Secretary of Navy for Air, has been nominated as Secretary of the Navy. He would replace Robert B. Anderson, selected as Deputy Secretary of Defense (AVIATION WEEK Mar. 15, p. 319). D. Walter Swan, assistant to the United Air Lines president, has been appointed Deputy Assistant Secretary for Public Affairs.

Striking engineers at Sperry Gyroscope Co.'s Lake Success, N. Y., plant last week voted to end their 12-day wage walkout, settling for management's two-week-old offer of a two-year contract providing for a 6.3% package increase. The Engineers Assn. had demanded a 15% increase (AVIATION WEEK Mar. 8, p. 7).

Earl Slick, board chairman of Slick Airways, is forming a new company at Winston-Salem, N. C., to handle his air transport management and financing projects plus various other businesses in which he is interested. Name of the new firm: Slick Enterprises.

New solution to the heat barrier problem, which has prevented widespread use of transistors (tiny vacuum tube substitutes) in avionic equipment, has been announced by Sylvania Electric. The company says it has raised operating temperature limit from 70C to higher than 150C by alloying silicon with previously used germanium. Pure silicon is used in experimental high-temperature transistors recently announced by Philco and Raytheon (AVIATION WEEK Feb. 15, p. 56; Feb. 22, p. 72). Sylvania also reports a new technique for making germanium transistors immune to surface moisture, thereby eliminating major cause of failure.

New sensitive gyro for aircraft and missiles, reported to be capable of detecting angular movement as small as 1/36,000th of a degree, is being mass produced by Minneapolis-Honeywell Regulator Co. Security wraps recently were taken off the new integrating-rate gyro, originally developed at Massachusetts Institute of Technology, which can measure both angular rate and displacement (AVIATION WEEK Feb. 22, p. 75).

New Plane for Small-Field Operation

The new Robertson SRX-1, five-to-eight-place monoplane seen aloft during a flight test (top view), is serving as a prototype in the development of a "zero-length takeoff" plane to be powered by two Continental turboprops geared to contra-rotating propellers and designed to require no ground run for takeoff. This short-field performance is based on use of a wing incorporating high-lift devices, such as the extensive leading-edge shrouds and trailing edge flaps shown in these two photos of the prototype. This prototype SRX-1 (Project Skylark) is powered by a 260-hp. Continental and has achieved a maximum level top speed reported at 163 mph., minimum power-on speed of 24 mph. and has made takeoff and landing runs of 100 ft. during tests. The future turboprop-powered SGTC version has an estimated top speed of 335 mph., zero minimum speed and vertical takeoff and landing. Project Skylark is being handled by Robertson Development Corp., Clayton 5, Mo.

F. U. Conard, president of Niles-Bement-Pond Co., died Mar. 14 at West Hartford, Conn. He was 63.

Financial

United Aircraft Corp., East Hartford, Conn., announces a net income for 1953 of $21,193,733 on sales of $817,557,395. The net is equivalent to $6.22 per common share after provision for the usual dividend of $5 a share on preferred stock. Company's 1952 net was $17,809,391, or $5.18 a common share, on sales amounting to $667,769,234.

Kellett Aircraft Corp., Camden, N. J., had a net income last year of $206,658 from sales totaling $1,983,850, compared with 1952's net of $156,686 and $1,759,161 in sales.

International

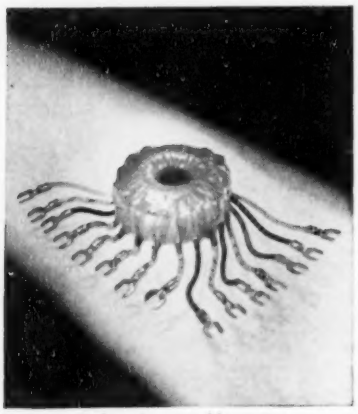
British Overseas Airways Corp. Constellation skidded during a landing last week at Singapore's Kallang Airport, somersaulted off the runway and exploded, killing 33 of the 42 persons aboard. The U. S.-built transport was on a pooled BOAC-Qantas Airways flight from Australia to London.

Canadian aircraft industry delivered equipment valued at $10,265,000 during fiscal 1953-54 to NATO members Great Britain, France, Italy, Belgium and The Netherlands.

Last Harvard trainer produced in Canada will roll off Canadian Car & Foundry's assembly lines at Ft. William, Ont., next month. The Harvard is RCAF's version of North American Aviation's T-6.

Scandinavian Airlines System has purchased an $800,000 flight simulator from Curtiss-Wright Corp., Wood-Ridge, N. J.

New heart for servo systems



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This toroid, produced in our plant as part of a magnetic amplifier, was developed by our Control Engineering group. It is typical of the custom design work they do.

Designed for a flight control system utilizing artificial "feel," our magnetic amplifier depends neither on fragile vacuum tubes nor delicate relays. It is simple, and when fixed in a thermosetting compound, impervious to shock. Also important, it is Airborne engineered for Airborne-actuated control systems.

If you have a problem in the control system category, call on us. For information on Airborne Actuators, see our literature in the I.A.S. Aeronautical Engineering Catalog.

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HILLSIDE 5, NEW JERSEY

The Aviation Week

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as others see us...

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Mr. Emil A. Polowniak
Chief Engineer
Selb Manufacturing Company

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WHO'S WHERE

In the Front Office

Howard A. Morey has resigned as president and general manager of North Central Airlines, will be succeeded Apr. 15 by **Hal N. Carr**, onetime executive vice president of NCA.

Joseph T. McNarney, president of Convair, will continue as chief executive of the San Diego aircraft builder and also become senior vice president of General Dynamics Corp., New York, under terms of the proposed merger of the two companies (AVIATION WEEK Mar. 8, p. 18).

Sidney A. Stewart has resigned as executive vice president of Delta-C&S Air Lines to join Niles-Bement-Pond Co. as vice president and manager of the Chandler-Evans Division, West Hartford, Conn.

Elliott Daland has resigned as vice president of Piasecki Helicopter Corp., Morton, Pa., but will continue as engineering advisor. **Thomas Mullen** is new assistant Washington, D. C., representative.

Stephen F. Keating has been appointed vice president of Aeronautical Division of Minneapolis-Honeywell Regulator Co., Minneapolis. **C. L. Peterson** is new vice president of the Brown Instruments Division, and **O. B. Wilson** has been promoted to general sales manager.

Guy M. Tomberlin has been elected vice president-operations of Resort Airlines.

Chester D. Seftenberg, former Deputy Assistant Secretary of the Air Force, is new treasurer for Lear, Inc., Los Angeles.

James E. Moore has been appointed assistant to the president of United Air Lines. **John T. Hancock** has been named assistant to the advertising director.

Ethridge C. Best, former director of Navy Bureau of Aeronautics' Electronics Division, has been named assistant to the president of Sanders Associates, Nashua, N. H.

Changes

Lovell Lawrence, Jr., founder and former president and board chairman of Reaction Motors, has been appointed chief of powerplant design for the missile branch of Chrysler Corp.'s Engineering Division, Detroit. Other changes: **Frederick B. Cline**, design staff engineer; **Glen M. Aron**, missile branch standards engineer.

Brig. Gen. Joseph T. Morris (USAF Ret.) has become assistant vice president of United Aircraft Products, Dayton.

William L. Smith has joined Fairchild Engine & Airplane Corp. as general manager of the Speed Control Division, Wickliffe, Ohio.

W. S. Haggett is new sales manager for Bristol Aeroplane Co. of Canada's Eastern and Western overhaul plants and has taken charge of U. S. sales. Also appointed: **J. H. Holt**, general manager of Bristol Aeroplane Engines (Western), Vancouver; **J. R. Hutton**, engineering manager (Eastern), Halifax.

Carl R. Wettereau is manager of Pacific Airmotive Corp.'s new Test and Handling Equipment Division, Burbank, Calif.

Morwick Ross has joined Northrop Aircraft, Hawthorne, Calif., as executive assistant to the administrative vice president.

INDUSTRY OBSERVER

► Watch for another major airframe and engine contract cancelation by USAF in the near future. This probably will be the last major aircraft program involved in the "weeding out" process begun a year ago by the Republican Pentagon regime, aimed at eliminating planes involved in major technical difficulties or excessive production costs.

► Boeing Airplane Co. has successfully flown a B-47 Stratojet by remote control, including takeoff and landing. A safety pilot was aboard during the remotely controlled flight, but did not touch the controls. Further development of the project has been suspended because of guidance problems.

► Although no official report has been released publicly, the 1952 crash of a prototype de Havilland DH-110 twin-boom fighter at the SBAC Farnborough show has been pinned down to wing flutter. Movie film from a spectator's camera showed clearly the right wingtip disintegrating from flutter before the rest of the aircraft was affected. De Havilland now is flying a modified version of the DH-110 aimed at Royal Navy use as a carrier-based fighter. New version of the DH-110 has folding wings and a "flying tail" control surface between the twin vertical fins.

► Navy is sponsoring development of a new supersonic fighter featuring chord extensions of the leading edge of the wing and an extremely low horizontal tail similar to positioning of this surface on the North American F-100. The chord extensions differ from leading edge slats in that they are a solid extension of the wing with no air flowing between the extended surface and the main wing. Chord extensions are used primarily to add lift and stability to highspeed aircraft during lowspeed performance, such as landing and takeoff. The low horizontal tail position is aimed at alleviating high-speed snaking in the transonic speed range.

► De Havilland is developing a new version of its Gyron turbojet for transport and bomber use. Present version of the Gyron was designed for use in supersonic fighters.

► Boeing is doing high-altitude test work on the Pratt & Whitney J57 split-compressor turbojet with a J57-powered B-47 at Wichita. Observers report performance is phenomenal. USAF once had a project to develop a four-engine version of the B-47 powered by either four J57s or four Allison J71 turbojets.

► Extremely high cost of titanium hardware is plaguing aircraft manufacturers who are anxious to utilize this new material wherever possible. A quarter-inch, 20-thread, flat-head screw about 1½ in. long now costs from $7.50 to $9 each.

► Willy Messerschmitt, who still is turning out versions of the ME 109 fighter at a Spanish factory, recently told an American visitor he has a jet fighter on the drawing board. Spain recently announced creation of a Ministry of Aircraft Production.

► De Havilland Mosquito that Diane Bixby will use on her round-the-world solo flight is powered by two Packard Merlin liquid-cooled engines developing 1,600 hp. each and equipped with external fuel tanks and a high-altitude pressurization system. Range is estimated at 4,000 mi. Miss Bixby expects to cruise at 400 mph. at altitudes between 35,000 and 40,000 ft.

► A new patent policy for the defense contractors in which the aircraft industry is vitally concerned is about to emerge from the office of M. Struve Hensel, counsel for the Defense Department. Industry is expected to get an opportunity to comment on the draft proposals before they become final.

► Aircraft Industries Assn. is considering the problem of allowable design and maintenance procedure departures for turbojet engines used in guided missiles in contrast to their use in piloted aircraft. Summary of proposed principles governing this problem is due for consideration soon by AIA guided missile committee.

AVIATION WEEK VOL. 60, NO. 12 MARCH 22, 1954

Twining Warns of Red Jet Striking Power

- **AF Chief of Staff says 137-wing force is the minimum air strength necessary to offset Russia's capabilities.**
- **Radford tells Senate subcommittee that U. S. energies must not be diverted to a 'purely defensive system.'**

By Katherine Johnsen

USAF Chief of Staff Gen. Nathan Twining last week warned of Russia's steadily increasing air capability, citing intelligence reports that their Tu-4 bomber force is being converted to more advanced, long-range bomber types.

Testifying before the Senate Military Appropriations Subcommittee, Twining also pointed out:

- "We know that the Soviets are capable of producing quality aircraft. This is confirmed by our examinations of MiG-15 fighters and by the very rapid conversion of the Soviet air force to modern combat types. These developments would not be possible in a technologically deficient aircraft industry. . . .
- "The Soviets have built up a large force of light jet bombers whose range and performance capabilities pose a serious threat to our interests in Europe and the Far East. . . .
- "Now completely equipped with improved jet fighters, (the Soviet air defense) system includes modern radar for warning and ground-controlled intercept purposes. The integration of modern satellite air forces into the Soviet system provides them an air defense in depth. . . .
- "Most significant is Russia's demonstrated ability to produce nuclear weapons. This ability, coupled with the delivery capabilities of the modern aircraft available in quantity within the Soviet air force, dictates that the U. S. increase its emphasis on air preparedness. . . ."
- The demarcation line between tactical and strategic air is fading. He reported: "Strategic and tactical forces are partially interchangeable, and provide the utmost flexibility in offensive power. . . .
- "The most significant development in the growth of our tactical potential is our ability to deliver nuclear weapons of all sizes on tactical targets. . . . It is our objective to equip every offensive fighter and bomber aircraft of our tactical forces to deliver nuclear weapons. . . . Both our strategic and tactical capabilities are adaptable to tactical use in situations of limited hostilities and in general war."

Twining predicted that in any future war tactical forces "may well take and give the first air blows. . . ."

- The 137-wing program is a "minimum" requirement. "I would like to emphasize," Twining declared, "that this program reflects our views as to the minimum air strength necessary to support our new national strategy. . . .

"One hundred thirty-seven wings is the minimum force which, maintained in immediate readiness and with emphasis on quality, can effectively discharge the tasks assigned the USAF. . . . The 137-wing force is adequate for the needs of national security as we foresee them now. Significant changes in the world situation may later necessitate a revision of this strength. . . ."

▶ **Tremendous Counter Attack**—Other witnesses before the group, headed by Michigan's Sen. Homer Ferguson, were Defense Secretary Charles E. Wilson; Adm. Arthur Radford, chairman of the Joint Chiefs of Staff, and the Secretaries and military chiefs of the three services.

Adm. Arthur Radford declared the U. S. strategic Air Force and the Naval carrier striking force "are without peer in this world."

Warning against diverting "a disproportionate part of our energies and resources toward setting up a purely defensive system," he said: "We must not forget that the greatest single deterrent of a Soviet air attack against the U. S. is the tremendous counter attack which she knows will immediately follow."

USAF Secretary Harold Talbott said, "Airpower—and especially the offensive power of the Strategic Air Command—is the keystone to our modern military strategy."

▶ **No Sharp Change**—Other views included:

- The "new look" reflects no sharp change in U. S. defense concept. Wilson called it "evolution, not revolution," and emphasized that the program was drawn to meet brush or fringe wars, as well as a general air-atomic war. Twining pointed out that the program is "no radical departure."
- Republican Sen. Barry Goldwater, in a speech on the Senate floor, discounted the Eisenhower Administration's role in recognizing airpower and placed substantial credit with former USAF Chief of Staff, Gen. Hoyt. Vandenberg.
- Secretary Wilson's observations on the need for keeping longhaul defense costs within the ability of the U. S. economy to finance them was challenged in a report by the Joint Congressional Economic Committee, which has a majority of Republican members. The group, headed by Rep. Jesse Wolcott, declared: "The economy is capable of meeting safely additional military expenditures if such expenditures are necessary for the military security.

"This is not a recommendation for more spending for national security purposes. It is rather an assertion that reductions in these programs which have been made and which are projected for the future should be justified upon their merits and not upon the premise that they are made necessary for economic reasons."

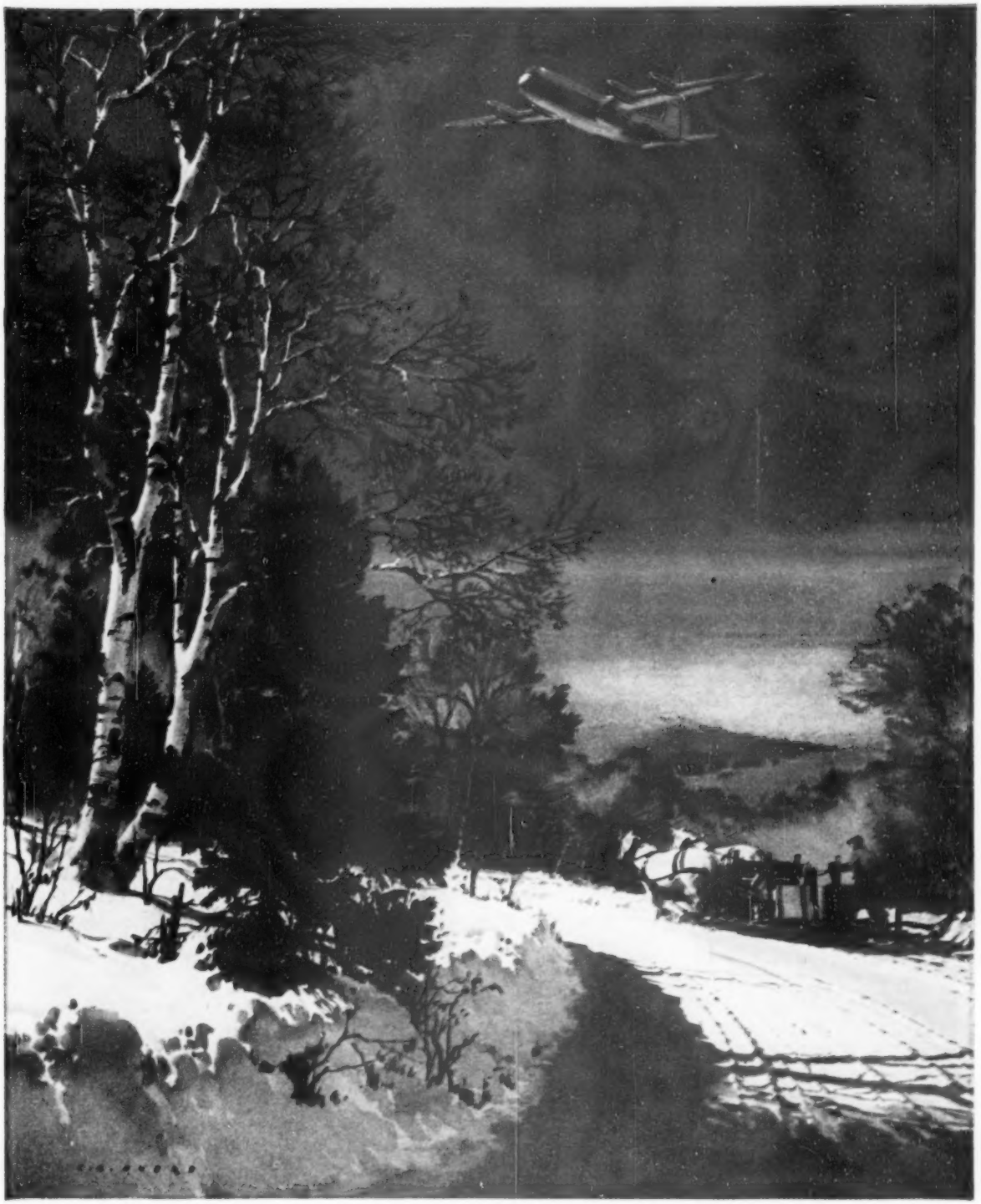
- The new defense program cuts the Army from 20 to 17 divisions, eliminates 49 ships from the fleet, and reduces the USAF program from 143 to 137 wings. Congressional moves for additional funds for the Army and USAF, and possibly the Navy, are developing.

▶ **Vandenberg Concept**—In his Senate speech, Goldwater, who served as a World War II pilot in India, declared

Navy Buying

Navy plans to buy 1,455 new aircraft with the $1.9 billion it has requested in new aircraft procurement money for fiscal 1955.

Navy Secretary Robert Anderson reported: "While this number of aircraft is below the number required for maintaining a satisfactory condition of modernization in our 9,941 operating aircraft, the lower number is sufficient because of the funding from prior years."



HAMILTON STANDARD . . . leader for years in propeller design and production, is supplying other equipment for such outstanding new aircraft as the Lockheed C-130, U.S. Air Force turboprop transport.

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Lear-Romec submerged fuel booster pump Model RG-11250. Military type B-26 configuration.

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the new LEAR-ROMEC submerged fuel booster pump

WHAT IT DOES: Supplies a solid line of vapor-free fuel, thus eliminating vapor lock and permitting the engine-driven fuel pump to function normally for faster starting of engine and faster rate of climb, even with fuel boiling in tank surrounding the booster pump. Also prevents boiling in fuel lines.

HOW IT PERFORMS: Test reports demonstrate that the Lear-Romec Model RG-11250 pump performs satisfactorily up to and including 25,000 feet. Configuration meets specification MIL-P-5249 (USAF). Other Lear-Romec fuel booster pumps available with tested performance up to 50,000 feet.

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SPECIAL DESIGN FEATURES: Uses two ball bearings in place of the usual one bearing, to permit safe dry running if the pump is inadvertently allowed to run on an empty tank. Vertically mounted and totally submerged in the bottom of the fuel tank, with only electric leads and plumbing connections exposed. Excellent "pump-down" characteristics, since the inlet is lower with respect to the mounting flange than other similar pumps. Will pump down to a fuel level of $\frac{1}{4}$" above the mounting flange. Weight – only 2.7 lbs. Current consumption – 2 to 2.4 amperes.

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WHEN AVAILABLE: Lear-Romec is producing these pumps *now* and has ample capacity to build them in quantity. Early delivery assured.

QUALITY: Lear-Romec engineering, research, manufacturing procedures, and test facilities represent your assurance that the Model RG-11250 centrifugal fuel booster pump is the finest B-26 type available today. Full engineering and test reports available upon request.

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RO-5

that "the use of this nation's Air Force as a retaliatory weapon, one that would by its strength dissuade our enemy from attack, is far from a new concept in the field of air strategy. Gen. Vandenberg, who for five years was USAF Chief of Staff, held strongly to this concept, and all his efforts were directed to such an objective. . . .

"The truth is that the new look in the Air Force has been in process of formulation since World War II. . . . To a great extent the new look is merely an acceptance of the old look. . . . The time has come when the careful planning of Gen. Vandenberg and his staff is bearing fruit in an Air Force consisting of a carefully planned, closely integrated unit. . . ."

Army Chief of Staff, Gen. Matthew Ridgway, however, looked on the soldier as "emerging ever more clearly as the ultimate key to victory."

"The need for a strong Army and the importance of ground warfare," he said, "remain as great as they ever were. In fact, the advent of new weapons and the increased importance of airpower have but given new meaning and wider scope to the dimensions of land warfare, without changing war's nature and basic objectives."

Unobligated Airpower Funds: $34 Billion

Air Force and Navy had $7.6 billion in unobligated funds and $26.2 billion in unexpended funds for aircraft and related procurement on hand at the beginning of February.

Aircraft procurement highlights:

- Air Force had $6.2 billion unobligated procurement funds on hand Feb. 1. Two principal reasons: a low rate of contracting and large-scale contract canceling, making funds available for reobligation. In January, contract cancelations amounted to $94 million more than contract obligations. USAF's obligations from new money were only $104 million for the first seven months of fiscal 1954, from July to February.
- USAF expenditures for procurement, indicative of production deliveries, have been at a high rate. Expenditures for the first seven months of fiscal 1954 totaled more than $3.9 billion and probably will pass the estimated total of $6 billion to $6.3 billion set for the year. USAF's unexpended balance on Feb. 1 was $18.8 billion, sufficient to finance several years of high-level production.
- Navy's unobligated balance for aircraft procurement exceeded $1.4 billion on Feb. 1. Obligations of new money over the July-to-February period totaled $403 million, or nearly four times USAF's new money obligations for the same period.
- Navy expenditures for procurement also were at a high rate, totaling $1.2 billion for the first seven months of fiscal 1954. If this rate continues, expenditures will exceed the expected $2-billion mark. The unexpended balance on hand Feb. 1: $7.4 billion.

Production B-52A Rolls off Line

Seattle—Boeing Airplane Co.'s first production B-52A rolled off the assembly line here last week, first of hundreds of the big eight-jet intercontinental bombers ordered by the Air Force.

USAF never has revealed how many Stratofortresses it has on order but one estimate places the number in the neighborhood of 250 to be produced here and at Boeing's Wichita, Kan., plant.

Air Force Secretary Harold E. Talbott has said the number involved will be "sufficient to equip more than seven heavy bomber groups."

Boeing already holds contracts for models through the B-52D. Largest of these is believed to be for the RB-52B. A number of the early production aircraft will be turned over to Boeing flight test for further experimental testing under A. M. (Tex) Johnston.

Static testing of the B-52 began earlier this month.

▶ **Side-by-Side** – Most apparent difference between production models and earlier prototypes is the side-by-side cockpit arrangement instead of the tandem seating of the experimental aircraft. Original tandem seating was at USAF request, but the change was initiated before the first prototype flew.

Stratofortresses will carry a crew of five or six, depending upon the mission. Although little has been said about the capabilities of the B-52, it is known that the Air Force regards the plane as much more than just a bomber.

It will have the same capabilities for carrying parasite aircraft and missiles incorporated in the B-36, Strategic Air Command's present heavy bomber. It also might be used for an early warning radar aircraft similar to the Lockheed military version of the Super Constellation. This could mean a great variety of missions.

The B-52 thus becomes not just a bomber but part of a "weapons system."

▶ **Forced Expansion**—To produce this "weapons system," Boeing is undergoing a forced draft expansion of its facilities at Seattle and Wichita. At the Kansas plant, the company is tooling up for second-source production that Secretary Talbott says will turn out 25 to 40% of the B-52s on order.

At Seattle, Boeing recently has completed a new electronics building, is near completion with a mammoth $5-million flight test hangar for the B-52 program, and has built a new air-compressor building for B-52 manufacture. Also scheduled are a tank farm and fueling facilities for the Stratofortresses as well as a new parking ramp.

Production of the huge bombers has required new manufacturing techniques and facilities. Assembly of the huge wings and fuselage requires enormous jigs, some of them of concrete. These are so large that they dictated the construction of a new jig building, with a 40-ft. ceiling necessary in one section to provide clearance for some of the jigs.

At Moses Lake, Wash., a $10-million B-52 supplemental test base is going up at Larson AFB. Production testing and calibration of the Stratofortresses will be done there after first flight from Boeing Field, Seattle.

▶ **First Flight**—Like the Boeing B-29 Superfortress, the B-52 was ordered into production long before the first flight of the prototype.

XB-52 was rolled out of a Boeing hangar here under tight security wraps on Nov. 29, 1951. But first flight of a Stratofortress prototype was that of the YB-52, which flew Apr. 15, 1952, one month after rollout.

The XB-52 did not make its first flight until Oct. 2, 1952. Boeing explains that the earlier ship was cannibalized to get the YB-52, with its design changes, into the air as soon as possible.

▶ **Folding Fin**—Design and performance details of the B-52 still are under security wraps. Wingspan is 185 ft. with a 35-deg. sweepback; length is 153 ft.; tail height 48 ft. The huge tail fin folds for easier ground handling. Control system includes spoilers. Vortex generators are being tested.

Speed is given as "more than 600 mph." and service ceiling as "more than 40,000 ft." Range is classified, but Air Force officials have indicated it is more than 6,000 mi. and that efforts are being made to extend it to 10,000 mi. without refueling.

The Stratofortress has quadruple main wheels in a tandem arrangement with single outrigger wheels near the wingtips. The main wheels fold inboard in an unusual crisscross arrangement. The outrigger wheels are for protection and do not touch the ground under normal circumstances.

The $5-million aircraft is powered by eight Pratt & Whitney Aircraft J57 turbojets rated in the 10,000-lb.-thrust class and is engineered to take more powerful engines when these become available. Gross weight is well over 350,000 lb. —WJC

CONVAIR XFY-1 is shown in horizontal flight attitude on its special mobile maintenance vehicle. Note thin wing.

Navy Takes Wraps off Convair and . . .

LOCKHEED pilot H. R. Salmon.

CONVAIR pilot James F. Coleman.

Official release of pictures and scanty details of the Navy's vertical-takeoff fighter prototypes (AVIATION WEEK Feb. 22, p. 15) last week climaxed a series of events highlighting sharp differences between the working press and Defense Department public relations policies.

Defense Department had set an official release date of 6 p.m. EST, Mar. 17, for pictures and a brief story on the Lockheed XFV-1 and the Convair XFY-1 prototypes. However, pictures of the Lockheed XFV-1 appeared in afternoon daily papers of Mar. 15, and Washington newsmen, disgusted with the long series of Defense Department fumbles on this project, followed with the complete VTO story.

Navy officials credited errors in advance distribution of XFV-1 pictures by the manufacturer with prematurely breaking the story. The pictures apparently first were published in Cleveland.

LOCKHEED XFV-1 is poised at an angle on its mobile rig used for transporting and servicing the Navy VTO fighter.

Lockheed Vertical-Takeoff Fighters

► **High-Ranking Byline**—The Mar. 17 release date was originally set by the Defense Department to match the publication by Collier's magazine of a major article on the two Navy fighters accompanied by four color photographs.

Navy originally scheduled the VTO release for Jan. 15 but apparently changed its mind in order to offer the magazine an exclusive story under the byline of a high-ranking member of the Navy's civilian secretariat. Photographers and a reporter of the magazine were given access to the VTO projects that were then classified "Secret" by the Navy. Representatives of other news media, who requested similar access, were refused on the grounds of military security.

► **Protests**—AVIATION WEEK, along with other news media, officially protested the Navy's handling of the VTO story to the Defense Department (AVIATION

LOCKHEED VTO is fitted with special landing gear used for highspeed taxi tests.

WEEK Feb. 22, p. 15). Assistant Secretary of Defense Fred A. Seaton told AVIATION WEEK he was opposed to the military services granting exclusive stories to individual publications on new weapons.

However, the Collier's magazine project on VTO continued as a staff-written article without the Navy official's byline.

Although the color plates required for publication of the VTO pictures were being processed weeks in advance of the eventual publication date, other publications with similar advance engraving requirements for the VTO pictures were denied either the right to take their own pictures or access to official Navy photographs. VTO pictures were released officially by the Defense Department at noon on Mar. 15, about the same time photos of the XFV-1 actually were appearing in a Cleveland newspaper.

► **Navy Defied**—Despite the Cleveland publication, Navy officially refused to authorize release of the VTO material before Mar. 17.

Washington newsmen defied the Navy's ruling on the grounds that no military security was involved if a national publication was appearing with four-color photographs of the VTO fighters before the end of the week, and published both story and pictures of the Lockheed and Convair prototypes.

Navy officials told AVIATION WEEK they were "investigating" the situation.

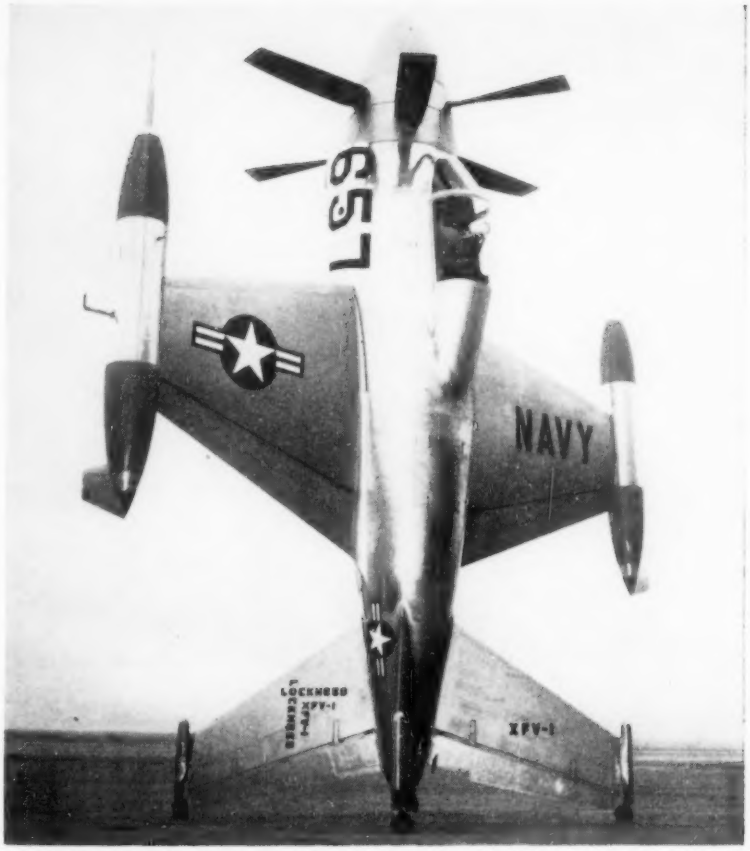
► **Vertical Takeoff, Landing**—Both the Convair and Lockheed prototypes are designed to take off vertically, swing into horizontal flight for normal fighter operations and then land vertically on a four-point tail landing gear with castering wheels.

The landing is accomplished by a swoop to vertical position and slow descent while hanging the aircraft on its propellers. Landing is expected to be the most difficult phase of the operation.

The Air Force also has two VTO projects nearing completion by Bell Aircraft Corp. at Buffalo (AVIATION WEEK Mar. 1, p. 11) and at Ryan Aeronautical at San Diego. The USAF projects use turbojets instead of turboprops.

► **Remarkable Climb**—In a three-page press release supplementing the Defense Department's four-paragraph announcement, Lockheed quoted its engineering vice president, Hall L. Hibbard, as saying:

"The XFV-1 points the way to the day when nearly all fighter planes will take off vertically. . . . The plane's twin-turbine powerplant will produce a thrust greater than the gross weight of the aircraft, thereby making possible vertical ascent and providing a remarkable rate of climb before reaching levelling off altitude.



LOCKHEED XFV-1 poised on its four-wheel castering landing gear, ready for takeoff.

LOCKHEED PILOT Salmon ascends ladder to get to cockpit of vertical XFV-1.

CONVAIR XFY-1 rests on landing gear, with pilot's seat rotated forward for takeoff.

CONVAIR VTO has engine intakes ahead of wing. Belly duct is for oil cooler.

Lockheed also says the XFV-1 can be landed in an area the size of a tennis court and has a level top speed "approximating 500 mph."

▶ **Similar Pattern**—The Convair and Lockheed projects follow the same general pattern. Points of similarity are:

• **Size and gross weight.** Both planes have about the same length, wingspan and gross weight. Wingspan is relatively short; fuselage length is considerably shorter than conventional jet fighters. Gross weight appears to be about half that of an F-86-type interceptor.

• **Power.** Both fighters use an Allison T40 turboprop developing 5,500 eshp. The T40 uses two power sections geared to a single set of propellers.

• **Propellers.** The XFY-1 and XFV-1 use Curtiss-Wright Turbolectric six-blade contra-rotating props with hollow steel, extruded blades.

• **Engine air intakes.** Both planes have engine air intakes located just aft of the propeller spinners on each side of the fuselage. Oil cooler air intakes are located on the belly—forward on the XFY-1 and under the mid-section on the XFV-1.

• **Landing gear.** The two fighters have a four-point cruciform arrangement of tail landing gear, using relatively small castering wheels.

• **Rotating pilot seats.** Both planes have gimbal-mounted pilot seats, allowing the pilot to maintain the same relative position during vertical and horizontal flight of the aircraft.

• **Special mobile transport vehicles.** Lockheed and Convair designed and built special mobile ground handling rigs capable of transporting the fighters and raising and lowering them from horizontal to vertical attitudes.

• **External fuel tanks.** Both aircraft use external wingtip fuel tanks that are not jettisonable. Lockheed's wingtip tanks appear larger than Convair's, but the XFY-1 appears to have more fuselage fuel storage space available.

▶ **Difference**—Main points of difference are:

• **Wing plan.** Convair has continued its reliance on the delta wing for high-speed performance, while Lockheed has retained the straight-edged, heavily tapered wing. Both wings are extremely thin, indicating a goal of high subsonic performance.

• **Controls.** Convair's delta wing requires the use of elevons that run along the full span. Lockheed uses controls on all four of its tail fins. In level flight, the two horizontal tail control surfaces will function as elevators and the two vertical surfaces as rudders. Convair has rudder controls in the two vertical fins of the XFY-1.

• **Engine exhaust.** Convair located the jet tailpipe just aft of the delta-wing's trailing edge, while Lockheed has lo-

VTO TECHNIQUE is depicted in this artist's conception of Lockheed fighters taking off straight up from vacant lots not much larger than each plane. Fighters in this sketch differ slightly from XFV-1 shown in released photos, particularly in makeup of engine intakes which appear to be positioned under the belly of these planes and are placed on each side of the nose in the photos of the actual XFV-1.

CONVAIR XFY-1 delta-wing VTO fighter resting on the ground in takeoff position. Plane has full-span elevons which combine functions of elevators and ailerons. Fins with darkly painted tips act as vertical stabilizers while plane is in level flight.

cated a flush tailpipe hole in the belly of the fuselage, just forward of the tail fins.

No armament is visible on the two VTO prototypes, although Lockheed's press release says the XFV-1 can carry "varied types of armament, including atomic weapons."

► **Three-Year Projects**—The Convair and Lockheed projects were begun about three years ago (AVIATION WEEK May 21, 1951, p. 15) and were completed late in 1953. The XFV-1 now is at Edwards AFB, Calif., where it has made highspeed taxi tests and a short, inadvertent flight in a horizontal position.

The XFV-1 is equipped with a special four-point landing gear for taxi tests and training operations in a horizontal position. This gear consists of two V-shaped struts faired into the wing root and the sides of the fuselage forward of the cockpit and joined at their apex by an axle supporting two fixed wheels.

Two additional castering wheels have been added in an upright position to two of the four tail fins. This gear will be discarded for actual operational use.

The Convair XFY-1, called the "Pogo Stick," will be transported by barge to Navy's Moffett Air Base near San Francisco for engine and preliminary flight tests. It will be suspended in a blimp hangar for tethered flight test. It has no auxiliary horizontal landing gear.

AVIATION WEEK's West Coast editor reports the XFY-1 is about 30 ft. from nose to tail, appears to have a wingspread of about 24 ft. Bottom tail surface appears jettisonable for forced landing. Development contract amounts to $8 million.

Convair test pilot James F. Coleman says most critical period in operation of the VTO is not at takeoff but in transition from vertical to horizontal flight. Best rate of climb will be in normal plane attitude.

Army Guard Units To Get 88 Copters

Approximately 88 helicopters will be delivered to Army National Guard units during the next 12 months.

Units located in the First, Second and Third Army areas are receiving Bell H-13s, and units of the other three Army areas are taking deliveries on Hiller H-23s. An eventual total of 272 copters are scheduled for delivery to Guard units authorized for aviation.

The helicopters are used to train Guardsmen in photography, ambulance service and other missions. Other aircraft assigned to the Army National Guard include the L-19, L-20 and L-23.

U. K. Reveals New Mach 1 Fighter

Defense ministers tell of first genuinely supersonic aircraft, hint at bomber and firepower developments.

(McGraw-Hill World News)

London—Britain's defense ministers, hinting at things to come for the Royal Air Force, report English Electric soon will roll out a large new twin-jet, swept-wing fighter that is expected to top Mach 1 in level flight.

The fighter will be Britain's first genuinely supersonic aircraft.

Hints of other new developments for RAF are being heard at the annual defense debates in the House of Commons. In addition to English Electric's fighter, the list covers such intriguing projects as:

• **Air-to-air guided missiles** capable of increasing by four times the firepower of Hawker Hunters and Supermarine Swifts, RAF's sonic front-line fighters.

• **Bomber Command's** Vickers Valiants, Handley Page Victors, and Avro Vulcans "will be two-and-a-half to three times more effective in altitude, speed, and range than their 1945 counterparts." Taken literally, this spells a performance of 700 mph. over 5,000 to 7,000 mi. at upwards of 50,000 ft.

• **Gloster twin-jet delta Javelin,** RAF's white hope in the all-weather class, "should be able to fly and fight at a height over 50,000 ft. and to have a speed between 600 and 700 mph."

• **Fighter control development** by the end of another year will permit the RAF "to direct about twice as many fighter formations against enemy bombers as it can now."

• **New cannon** designed for Hunters and Swifts "will increase the rate at which the day-fighter force as a whole can hurl high explosives against the enemy by more than nine times the present rate."

▶ **Dreary Story**—These glimpses of the future—and the statistical teasers that often are very ambiguous—are what grab the headlines. But this year's RAF review also tells another, more dreary story. Hardly anything promised to RAF over the past three years is a reality yet. These notes from a reporter's notebook illustrate the point:

• **Supermarine Swifts,** RAF's first swept-wing fighter, was expected last June. First squadron has just been formed, but it is not fully operational. Peak production of Swifts will not be reached for another year.

• **Hawker Hunters,** scheduled to go into service on the heels of the Swifts, may not be formed into a fully operational squadron before the end of this year. Peak production of Hunters is nearly a year and a half away.

• **Vickers four-jet Valiant** bombers, built to a design drawn in 1948, will be delivered in small numbers this year, but it will be 1956 before you can count them in any quantity. The superior model Avro Vulcans and Handley Page Victors will not be available in quantity before 1958.

• **Gloster Javelin all-weather fighter** will not start coming off the production line until next fall and peak production won't be reached until 1956.

The immediate state of Britain's air defenses is even more parlous than this list implies. The 430 Canadair-built F-86 Sabres, shipped to the RAF as interim defense aid over the past several months, by-and-large are lying idle for one reason or other.

▶ **Sabre Snafu**—USAF officers on the Continent report that some 110 Sabres have been delivered to RAF 2nd Tactical Air Force in Germany so far. By April, the number will be 220, it is hoped. But today less than three dozen of these Sabres actually are in operational condition.

Most of 2nd TAF's Sabres, USAF sources say, are grounded in Germany, either for lack of maintenance know-how or personnel or for lack of spare parts.

Lack of spares, pilots and crews is keeping the rest of the Sabres grounded at two airfields in England and at one in Northern Ireland.

▶ **Idle by Design**—The Sabre situation is not really the snafu it sounds. Most are lying idle by design.

U. S. and Canada gave Sabres to the RAF—some $86 million worth—in order to provide interim aid until Hunters and Swifts came into service. If trouble came in the interval, the Sabres would be there to combat it.

But RAF always has been reluctant to gear its tight budget to training pilots and crews for Sabres. Naturally, the air marshals preferred to spend their limited funds preparing for their regular Swift and Hunter squadrons. The generally easing international situation has allowed them to do just this at the expense of leaving many Sabres idle.

▶ **Sabres for Germany?**—But what happens to the Sabres when the Hunters and Swifts finally do come along? This question is very much in the air today. A plan is afoot to withdraw the lot from the RAF in the next year or so and turn them over to the proposed new German air force.

This rather neat idea came along late in the game. Originally, when it looked as though German rearmament would proceed relatively quickly, North Atlantic Treaty Organization planners had earmarked Hawker Hunters for the Germans. The Hunters actually earmarked were 468 jets the U. S. ordered in the U. K. last year under the offshore purchase program.

But neither the Hunters nor German rearmament have materialized anywhere nearly as quick as it had been hoped at first. It is obvious now that the offshore purchase Hunters are needed first and foremost by RAF. The idea is that they will be "swapped" for RAF's F-86s, which will be turned over to the Germans.

(To U. S. plane makers, of course, this has its good point: Had original plans gone through, the new German air force might have been formed around British aircraft. Now supplies almost certainly will come from the U. S.)

▶ **No Crisis**—In the war-heavy atmosphere of 1950-51, all this lack of preparedness would surely have had defense planners here and at NATO tearing their hair. But it would be wrong to say there is much anxiety over the state of British defenses now. The order of the day is "a slow buildup for the long pull."

The danger is that development lags will serve to outdate aircraft by the time they finally reach service. In response to this danger, British defense planners have taken a long overdue step to shorten the time between design and production: They have adopted a scaled-down version of U. S. procurement policy, whereby a quantity order is placed for a given design instead of an order for one or two prototypes.

The first aircraft to get the effects of this policy is English Electric's new supersonic fighter. Twenty have been ordered "for development trials."

It has been procurement policy rather than production difficulties that have held up the arrival of the RAF's front-line aircraft for so long. Trying to work out the technical bugs of a new sonic fighter or bomber on one or two prototypes has proved to be an invitation for delay. In cases such as the Gloster Javelin, where two of the first four models crashed, the delays have been very serious.

▶ **Final Injection**—Another development in the past month that promises to insure the RAF's re-equipment program ultimately will succeed is another, and perhaps a final, injection of U. S. aid. It was announced in the House of Commons that by this June an additional $110 million in U. S. aid will be granted to RAF. A slightly smaller sum, $100 million, will be requested next year.

The major effect of this aid will be to allow RAF Bomber Command to place quantity orders for Vulcans and perhaps Victors. Only 25 Vulcans are on order now; two have been built. One Victor has been built.

AA Hits Nonsked's Shuttle Proposal

American Airlines last week attacked North American Airlines' proposal to operate a shuttle aircoach service between New York and Washington (AVIATION WEEK Mar. 15, p. 324) as "too superficial to merit serious consideration."

The scheduled airline, which already flies aircoach service between New York and Washington, called on Civil Aeronautics Board to dismiss the nonsked's application.

▶**Political Gesture**—"The proposal appears to be primarily a political gesture to divert attention from the more basic issues posed by North American's disregard of law and sound regulatory policy," AA claimed in a petition to CAB.

American said, "There is no factual showing that the (shuttle) experiment is feasible, an omission which suggests that North American is not seriously seeking Board approval, but merely hopes to capitalize on the publicity involved."

Because North American's proposal "seeks entry into a market already served by three certificated carriers, National, Eastern and American," it is without merit, American charged.

Monocoupe Prototype Logs 1,000 Hours

Monocoupe Aircraft & Engine Corp. has logged more than 1,000 hr. on its prototype all-metal, four-place, twin-engine lightplane and soon will present its Model 2 for Civil Aeronautics Administration certification, Robert G. Sessler, president, reports.

Prototype Monocoupe was flown in 1952. Flight tests, Sessler says, "exceeded in all categories the carefully prepared windtunnel calculations and data."

Goal of the company has been to perfect a high-performance aircraft with definite single-engine performance that could be marketed in the $20,000-$25,000 field, he adds.

The plane is powered by two 150-hp. Lycoming engines and is designed to cruise at 193-mph. sea level. Other specs: rate of climb 1,968 fpm., single engine at gross 645 fpm.; ceiling 20,000 ft. on two engines, 6,000 ft. on one; full flap stall 55 mph.; range 800 mi.; takeoff run (10 mph. wind) 500 ft.; wingspan 32 ft.; length 25 ft.; wing area 160 ft.; aspect ratio 6.4; normal gross weight 2,600 lb., empty 1,300 lb.

Airborne Arctic Tests

Exercise Wind Chill, an arctic training maneuver involving 20 C-124s and about 850 paratroopers, will be held this month at Thule AFB, Greenland.

The airborne force will simulate attacks on several installations to give air base personnel practice in defense tactics. It is the northernmost airborne maneuver yet held by U.S. armed forces.

Ryan Increases Pay Of Top Executives

Ryan Aeronautical Co., of San Diego, Calif., paid its president, T. Claude Ryan, $48,374 in salary and $8,434 in pension retirement and similar payments during fiscal 1953 ended Oct. 31.

The company reports to Securities & Exchange Commission that other salaries paid were: G. C. Woodward, executive vice president, $37,824 plus $6,595 in allied payments; and all officers, $141,258 plus $24,735. Ryan's salary exceeded his 1952 pay by $5,874 and Woodward's by $5,324.

The firm had net income of $1,475,446 Oct. 31, compared with $878,359 the previous year. The 1953 backlog totaled $48 million. It was $67 million for 1952.

Ryan reports say he is confident the company will continue to maintain and improve its percentage of the total aeronautical market "despite indications that production rates will be at somewhat lower levels than in 1953."

Ryan now is building its 1,800-lb. Firebee pilotless target plane, the XM-21 for Army Ordnance, the Q-2 for USAF, and the KDA-1 for the Navy.

The firm employed 4,100 men and women at the end of the fiscal year.

Continental Reports Salaries, Projects

Continental Aviation & Engineering Corp., subsidiary of Continental Motors Corp., paid its president, Clarence Reese, $104,546 for fiscal 1953 ended Oct. 31.

Other salaries of more than $25,000 reported to Securities & Exchange Commission: Arthur W. Wild, vice president, $56,397; Lewis P. Kalb, advisory consultant, $48,202; H. M. Parker, treasurer, $26,769; and Carl F. Bachle, vice president, $37,549.

▶**Copter Parts**—Continental made net earnings of $325,101 during the year, concentrating on production of its nine-cylinder R975 radial engine and replacement parts for Piasecki helicopters for Navy.

Toward the end of the fiscal year, the firm began production of MA-1 trailer units containing Continental-Turbomeca Model 140 compressed air generators to start the Pratt & Whitney Aircarft J57 engine.

▶**J69 Developed**—The company also is busy on the J69 turbojet engine, and an advanced version of the French Marbore. Continental has increased the engine's thrust beyond the 880 lb. developed by the original French model and lowered its fuel consumption.

First J69s to be produced will be used in the Air Force Cessna T-37 jet trainer. The J69 also powers some models of the Ryan Firebee. Others are powered by the Fairchild J44.

Continental also is at work on a control system to be used in applying the J69 to C-46s, which Flying Tiger Line has tested successfully.

Aviation CIR Joins Cornell-Guggenheim

Aviation Crash Injury Research has joined Cornell-Guggenheim Aviation Safety Center as a result of organization changes designed to improve integration and coordination of ACIR's aviation activities.

ACIR, formerly at Cornell Medical College, has transferred its facilities to larger quarters in New York. The automobile safety research section of CIR still is at the Medical College and has taken over space formerly used by the aviation department.

Jerome Lederer, director of Flight Safety Foundation, also is director of Cornell-Guggenheim Aviation Safety Center. A. Howard Hasbrook, formerly administrator of CIR's aviation research at Cornell Medical College, serves as associate director of C-GASC and as chief of aviation crash injury research.

Hugh De Haven, founder of Crash Injury Research in 1942, continues his duties as director of automotive crash injury research at Cornell University Medical College and also will serve on an advisory committee with Dr. Wilson G. Smillie and Dr. Emerson Day to continue the aviation division's association with Cornell's medical college.

Board Sets Cause In Nonsked Crash

Civil Aeronautics Board finds that the probable cause of a Miami Airline DC-3 crash near Selleck, Wash., last Apr. 14, was progressive failure of both engines "due to the lack of compliance with proper maintenance standards."

The Board ascertained that first one engine, then the other, progressively failed while the flight was in its last route segment. The plane crashed in the Cascade Mountains, killing four of its 22 passengers and the two pilots. A fifth passenger died later. The stewardess and two relief pilots survived. The plane was demolished, but there was no fire.

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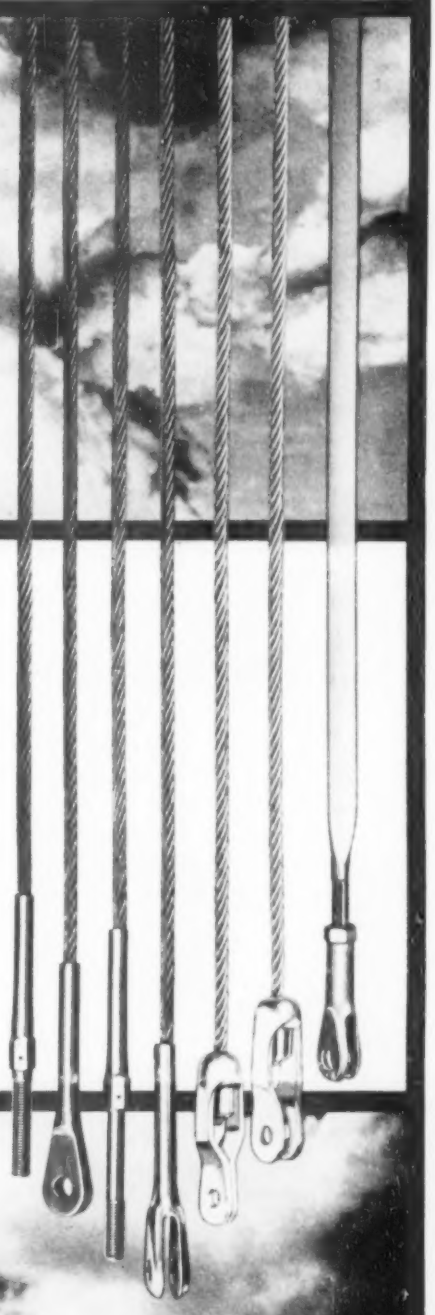

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PAA Replies to Subsidy Charges

Pan American World Airways has challenged allegations that it is boosting its subsidy requirement by financing expenses of affiliated companies and failing to offset subsidy with the earnings of affiliates.

The allegations were made by Rep. John Rooney, ranking Democrat on the House Commerce Appropriations Subcommittee (AVIATION WEEK Mar. 8, p. 13). At Rooney's request, Civil Aeronautics Board submitted a listing of all PAA holdings for the record (see table).

In its reply, Pan American makes two main points:

• On the question of increased expenses because of relationships with affiliated companies, PAA declared that in two investigations CAB "has found the exchange of expenses and revenues (between PAA and affiliates) to be entirely appropriate, no adjustments having been made for improper charges."

The investigations were made in connection with the Latin American rate case, covering the period from 1948 through 1951, and the Atlantic case, covering the period 1946 through 1952.

• On the question of offsetting subsidy with excess earnings from affiliated enterprises, PAA observes that "the CAB has changed its position and now contends that any excess earnings on these (affiliate) investments should be offset against mail pay subsidy requirements.

"For the future, no matter whether a system rate or a divisional rate is fixed for Pan American's operations, it would be necessary for the CAB to carefully analyze both earnings and investments in these activities to determine whether or not excess earnings are available to offset mail pay requirements. . . ."

The airline also points to several instances in which its relationships with affiliates have reduced its subsidy requirement:

• In 1952, of the $705,000 in expenses incurred by PAA's system purchasing office, more than $450,000 was defrayed by commissions charged to affiliated and associated companies.

• The entire 1952 cost of the system shipping department, amounting to $109,000, was defrayed by commissions earned on shipping for affiliates, and a profit of $9,000 was realized.

• The 25 offices in Pan American's U.S. sales organization realized commissions totaling $730,000 from affiliated and associated companies in 1952.

• The substantial profits that have been made on sales of obsolete aircraft to affiliated companies have been used to reduce subsidy requirements.

Pan American Stock Holdings

This is a breakdown of the investments, as of Dec. 31, 1952, of Pan American World Airways, presented to the House Appropriations Committee by the Civil Aeronautics Board:

	Number of shares or principal amount	Cost or book value
AFFILIATES:		
Aeronautical Radio, Inc	6,406	$229,366
Aeronautical Radio of Siam	1,396	5,233
Airlines Clearing House	1	101
Airlines Terminal Corp	143	7,257
Central Air Terminal, Inc	10	19,410
Cia de Aviacion Pan American Argentina	2,430	12,500
East Side Airlines Terminal Corp	150	24,000
Hotels Grandes, s. a	9,000	236,842
Intercontinental Hotels Corp.:		
Preferred	50,000	1,400,000
Common	50,000	1,000,000
International Aerradio (Caribbean)	2,400	71,736
Pan American Airports Corp	10	1,000
Radio Aeronautica de Cuba:		
Common	1	22,632
Preferred	574	82,460
Sociedade Aeroportos Pan Americana de Macau	4	13,333
Sociedade Portuguesa de Agencia Aereas	4	12,046
Uraba, Medellin and Central Airways, Inc.:		
Preferred	1,500	214,763
Common	3,000	158,000
Aero Puertos Unidos	10	51,000
TOTAL		$3,561,679
INVESTMENTS IN OTHER STOCKS:		
Aeronaves de Mexico	1,700	249,730
Aeropuerto de Bogata	441	252,722
Aerovias Nacionales de Colombia	1,525,376	2,352,629
Aerovias Venezolanas	741	221,463
American Club of Buenos Aires		2,498
Bermuda Development Co	5,221	189,880
Bewind Golf Club		300
Caracas Country Club, Venezuela		2,000
Compania Dominicana de Aviacion	600	40,000
Compania Mexicana de Aviacion	125,572	523,018
Compania Panamena de Aviacion	1,650	33,000
Compania Cubana de Aviacion	42,000	420,000
Expreso Aereo Interamericano	40	71
Expreso Siderurgica de Paz del Rio	150	168
International Country Club		125
Kokusia Hotel, Kogyo Kabushiki Haisha	2,400	334
La Granee Country Club		1,200
Liberian Development Co	10,000	50,000
Lineas Aereas Costarricenses	20	35,587
Lineas Aeaeas de Nicaragua	800	87,333
Middle East Airlines Co	4,500	65,043
Panair do Brasil	211,200	196,297
Pan American Grace Airways	50,000	500,000
Nejnpa Country Club		300
Riveria Country Club		600
Santo Domingo Country Club		100
Servicio Aereo de Honduras	800	80,000
Gold Club of Lima	1	1,400
Pranakorn Hotel Corp., Bangkok	1	12
Bonds:		
Israel Government compulsory loan		69
Performance bonds		3,853
Notes:		
Aircraft Service Corp		914
America India, Inc		5,540
Aeronaves de Mexico		51,808
TOTAL		$5,368,504
GRAND TOTAL AFFILIATE AND OTHER INVESTMENTS		$8,930,183

Air Leaders to Testify On Civil Aviation Bill

All segments of the aviation industry are expected to participate in the first major reconsideration of civil aviation law since the enactment of the 1938 Civil Aeronautics Act. Hearings will start Apr. 1 before the Senate Interstate and Foreign Commerce Committee.

Hearings will be held by the full committee, headed by Sen. John Bricker. Sen. Pat McCarran, co-author of the 1938 act and author of the 177-page bill revising that act, will be the first witness. McCarran says he does not necessarily endorse all the provisions of his bill. He has presented it primarily as a basis for a re-evaluation of aviation law.

► **Foundation**—The Commerce Committee expects to accomplish information-gathering at this session as a foundation for further action in the next Congress.

Highlights of the bill, which would set up a seven-member civil aeronautics authority and an independent air safety

board, were reported in AVIATION WEEK (Jan. 25, p. 91).

Following is a section-by-section report of significant changes the bill proposes to the 1938 act.

► **Title I—General Provisions—**

• **Definitions:**

Sec. 101 (2) Defines "regular" and "irregular air carriers" for the first time: A regular air carrier, as one "which conducts its service so as to serve traffic between the same two or more points either according to a published timetable or with flights so regular or frequent that they constitute a recognizably systematic service"; and an irregular carrier as any "other than a regular air carrier."

It puts airfreight forwarders in the air carrier category, making no distinction as to indirect operations.

(7) Exempts employes of certificated repair stations and aircraft manufacturers from the requirement that they be certificated with "airman" status.

(24) Expands "interstate air commerce" to include operations to any territory or possession and operations between points in the same state, routing through other states. The "overseas" category is eliminated, leaving only two categories of air commerce: "foreign" and "interstate."

• **Declaration of Policy:**

Sec. 102 (A) Adds a new aim of national aviation policy: "The public interest in the furtherance of national policy." It retains the aims of aviation development in the interests of commerce, the postal service and national defense.

(B) Adds the factor of "free interprise" to those to be taken into account in the regulation of air commerce.

(G) Sets forth a "state's rights" declaration, giving states jurisdiction over wholly intrastate operations.

(H) Adds a new policy of "the maintenance by the U. S. of the greatest possible influence at all times in world aviation."

• **Public right of transit:**

Sec. 103 (B) Spells out for the first time the right of private fliers to operations in the U. S. airspace.

► **Title II—Civil Aeronautics Authority—**

Sec. 201. Establishes a seven-member civil aeronautics authority, appointed by the President and confirmed by the Senate; limits to four the members from any political party; sets a $17,500-a-year salary for members.

Sec. 202 Establishes an "executive officer," appointed by the authority at $17,000 a year.

Sec. 204 Provides for the authority to assist the states in development of civil aeronautics.

Sec. 212 Directs the authority to formulate and implement a national program for protection of aerial approaches to airports.

Sec. 213 Incorporates provisions of the 1946 Airport Development Act.

► **Title III—Air Carrier Economic Regulation—**

Certificates of public convenience and necessity required.

Sec. 301 (A) Requires all air carriers—irregular and regular—to obtain certificates.

(D) Encourages the authority to initiate investigations for new transportation and, if found needed, to invite applicants.

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(E) Authorizes the issuance of "experimental" certificates which would not require a showing of "public necessity," provided the service would not substantially duplicate existing service. Mail compensation could not exceed 20% of the "reasonable cost" of performing the service.

(F) Authorizes certificates covering "area" service, without specifying points to be served.

(H) (3) Authorizes the authority to require extensions of domestic service after hearings.

• **Permits to foreign air carriers required:**

Sec. 302 (A) Bans foreign air carriers from engaging in interstate air commerce or interstate air transportation.

(B) Provides that foreign operations into the U. S. must be covered by agreement between the U. S. and the country concerned.

(D) Provides that hearings are to be held on applications of foreign carriers to operate into the U. S. if requested within a specified time.

• **Rates for the transportation of mail:**

Sec. 306 (A) Removes the requirement for separation of airmail pay and subsidy, re-stating the 1938 act.

• **Interlocking relationship:**

Sec. 309 (A) Adds underwriters and air contract carriers to the parties between whom relationships are prohibited without approval of the authority.

(D) Gives the authority powers over the issuance of securities by air carriers.

• **Pooling and other agreements:**

Sec. 312 (A) Lessens the requirement for filing agreements, authorizing the authority to stipulate agreements to be filed.

(B) Provides that no order disapproving an agreement may be issued without hearings.

• **Exemption of carriers:**

Sec. 316 (B) (2) Limits exemptions from the requirement for a certificate to air transportation involving planes with a gross takeoff weight of 12,500 lb. or less, or air transportation temporarily supplementing certificated service.

▶ **Title IV—Air Contractor Economic Regulation—**

(Note: This entire title is new. Under present law air contractors are not subject to economic regulation. There is a difference of legal opinion as to whether owners of corporate aircraft fall into this category.)

Sec. 401 Requires all air contractors to obtain licenses and spells out a procedure similar to the procedure for obtaining a certificate.

Sec. 402 Authorizes the authority to exempt contractors from economic regulation to avoid "undue or unwarranted burdens" if this is considered in the "public interest."

▶ **Title V—Nationality and Ownership on Aircraft—**

(This title makes no significant changes in existing law.)

▶ **Title VI—Civil Aeronautics Safety Regulation—**

Sec. 601 Directs the authority to promote safety of flight in "air navigation" and "protect persons and property on the ground from hazards resulting from air navigation." Present law is not as inclusive, mentioning only "safety of flight in air commerce."

▶ **Title VII—Air Safety Board—**

Sec. 701 Establishes an air safety board of five members, appointed by the President and confirmed by the Senate, and sets terms of six years and salaries of $9,000 a year for members. It stipulates that at least one member must be an airline pilot with 3,000 hr. scheduled flying time and that at least one member must be a licensed private flier.

Sec. 704 (1) Gives the board discretion as to which accidents to investigate and requires it to report to the authority on facts and probable cause of an accident "to the extent ascertained." Present law requires investigation of all accidents and conclusions, regardless of how scanty the evidence.

(3) Gives the board discretion on making its accident findings and recommendations public.

(5) Imposes the new duty on the board of making and publishing "technical studies."

Sec. 706 Bans use of "any record" of the board in suits or actions for damages.

Sec. 790 Requires an annual report by the board to Congress.

▶ **Title VIII—Other Governmental Authorities—**

Sec. 801 (A) Requires Presidential approval of licenses to air contractors as well as certificates to air carriers for operations outside the continental U. S.

(B) Requires that all international air agreements take the form of treaties, subject to Senate confirmation.

Sec. 803 Directs the Weather Bureau to make recommendations to National Advisory Committee for Aeronautics on research projects to promote civil aviation.

Sec. 804 Directs the authority to recommend projects to NACA.

▶ **Title IX—Penalties—**

• **Civil:**

Sec. 901 (A) Imposes civil penalties for violations of "any requirement of any order, rule, regulation, or certificate" issued under the statute, as well as for violations under the statute itself. Present law proivdes only for statute violations.

• **Criminal:**

Sec. 902 (A) Raises the maximum fine for economic violations from $500 to $2,000 for the first offense, places no maximum for subsequent offenses, and eliminates "ticket agent" in the listing of those liable to penalty for granting rebates.

(F) Strikes out the 1938 act's provision for fines for neglect or refusal to testify.

▶ **Title X—Procedure—**

Sec. 1001 (A) Gives the authority broad power to delegate functions either to members of the authority or employes.

(D) Gives the authority power to prescribe rates for foreign, as well as domestic, air transportation, and also authority to prescribe rates for air contractors in both domestic and foreign operations.

(E) Adds to the factors to be considered in rate making: "The right of every person within the limits of fair competition . . . to risk his capital or forego possible profits in an endeavor to build his business or . . . expand a new venture."

(I) Extends the power of the authority to establish through-service and joint rates to foreign air carriers as well as to U. S. carriers.

Sec. 1007 Gives the courts jurisdiction to enforce violations of air contractor licenses and foreign air carriers certificates, retaining provision for court jurisdiction over U. S. air carrier certificates .

Army Reviews Copter Lessons

Cargo versions a must, service decides. Procurement schedules should insure adequate production capacity.

By G. J. McAllister

U. S. Army, reviewing three years of helicopter operations that includes their extensive employment in Korea, has reached these conclusions:

- Cargo helicopters have proved their military usefulness.
- Adequate procurement quantities of helicopters must be programmed in order to insure an industry production potential.
- Cargo helicopters, properly developed and used, will aid the field commander in the accomplishment of his mission even though faced with the threat of mass destruction weapons.
- Close supervision must continue to insure effective policies and procedures.

The combat commander has wholeheartedly accepted the inclusion of cargo helicopters into the Army's transportation system, the Army report states.

"Even though the cargo helicopter in use by the Army is a wonderful machine," Army notes, "it still has many recognized shortcomings."

Major shortcomings are:

- Small single lift capacity.
- High maintenance requirements.
- High degree of complexity.
- Relatively low service life of components.
- Variations in performance when operating under conditions other than ideal.

"In effect," the Army says, "the desirable machine should be a simple, rugged, reliable, and easy-to-maintain piece of military equipment. To this end, future designs and proposals have been reviewed to determine the degree to which these goals may be achieved without compromising performance capabilities.

▶ **Size Increases Problems**—"In view of the present state of the art, the ideal military transport helicopter is undoubtedly more than ten years away. Using present-day engineering know-how, larger helicopters will follow existing functioning principles and construction techniques, refined in each case to meet specific craft requirements.

"This means that as helicopters get larger, maintenance and supply support requirements will increase. However, not in direct proportion to the increase in size or performance capability. For example, if a new machine's capability or size is double its predecessor the support requirement should be slightly less than double. The actual support requirements increase cannot be determined at this time," the report states.

Army observed that it took about two years from the first indication that cargo helicopters would be introduced into the army structure until the first helicopters were received in quantity. Another six months had elapsed before the first unit engaged in an actual operation with cargo copters.

▶ **Convertiplane Plans**—"The initial concept for utilization of cargo helicopters envisaged the procurement of large quantities of helicopters in a relatively short time. Additionally, it was felt that the future development of the convertiplane could be adapted to techniques for helicopter operations. Each of these assumptions proved to be incorrect," the Army said.

The reasons:

- Production time of cargo helicopters was longer than anticipated. Production slippage was one year in the case of one manufacturer and two years for another.
- A satisfactory, large-capacity convertiplane is still five years away. Military leaders have indicated that the convertiplane should be considered the ideal replacement for the assault transport, which means that development will not proceed along the lines of a short-haul transport. Cargo helicopters will be used for the short-haul moves in the combat area.

▶ **Combat Utility**—Data indicates that a cargo helicopter of the H-19 type can deliver an average of two tons of cargo per hour of operation. Normal availability of all helicopters assigned to a unit was about 57% or 12 of the 21 aircraft assigned. Original planning was based on availability percentage of 66% or 14 out of 21.

Average daily flying time per aircraft was established at 4 hr. during operational missions. New York Airways, which operates the same type of equipment, has tabulated their first year of operation and their average flying time per calendar day was 3¾ hr.

Experience also proves that present-day copters assigned to a company are not capable of moving in one airlift a combat equipped infantry rifle company.

Army gives these reasons:

- Helicopters were not always operated under ideal conditions.
- Capabilities of the individual aircraft as stated by the manufacturer were optimistic.
- Anticipated availability of aircraft was not as high as expected because of high maintenance and supply support requirements. Accomplishment of moving a rifle company in a single airlift should be resolved when larger craft are available. Army plans to split the output of the Sikorsky H-37 with the Marine Corps. Craft will carry 28 fully equipped soldiers.

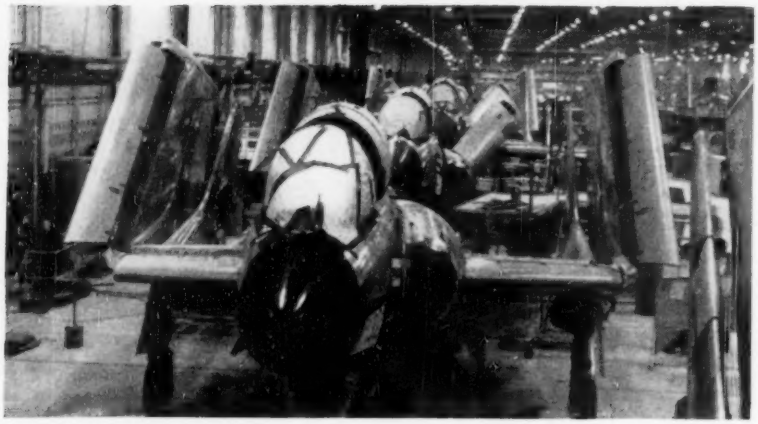
▶ **Quality—Employment** and the size of the Army dictated the number of helicopters that the Army required. Initial requirement stated that one company would be required for each authorized division in the troop program and one battalion would be required for each corps.

The helicopter industry was not capable of meeting the Army's requirements in a short time, because of production capability, and it was necessary to extend the procurement program over a period of years. After much deliberation a cargo helicopter program was set up in 1953 for procurement of a sufficient quantity of helicopters to equip 12 battalions with 67 copters per battalion.

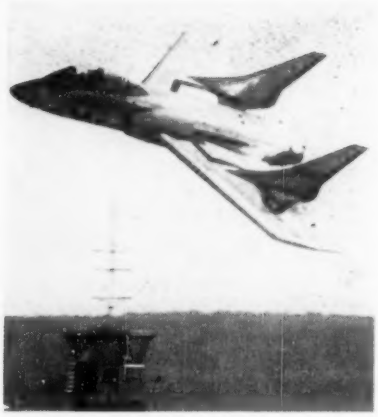
This reflected industry's capacity to produce and the development of cargo copters suitable for Army use. The procurement plan extends through fiscal 1959. To date the Army has less than 100 cargo helicopters in service.

Chile Gets New Beech Trainers

Chilean air force pilots line up before 12 new Beech Mentor military trainers at the factory in Wichita, Kan., prior to takeoff on a 6,000-mi. mass flight to Santiago. The Chilean air force Mentor contract totals more than $1 million. USAF designation for the Mentor is T-34A. Beech is also producing Mentors for Japan.

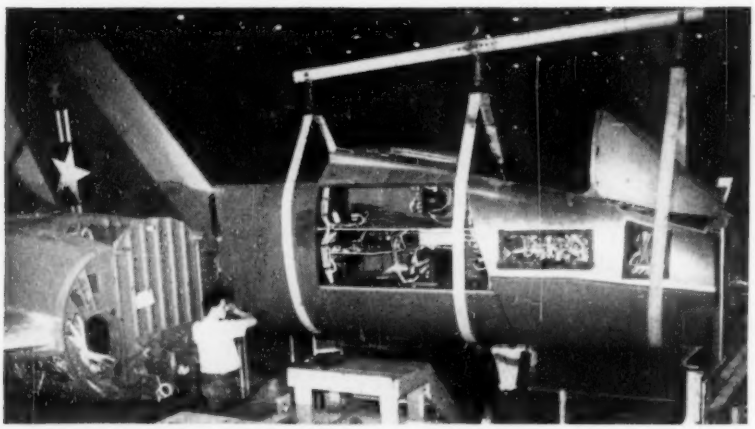


NEARING COMPLETION, string of Cutlasses move along line with wings folded.



ACTION VIEW shows Cutlass top detail.

First Photos Show F7U-3 Production



NOSE SECTION minus canopy and some of plane's avionic gear is eased into position on belly-band slings for connection to fuselage center section (left). Center fuselage's curved outer portion houses duct for air inlet to turbojet.

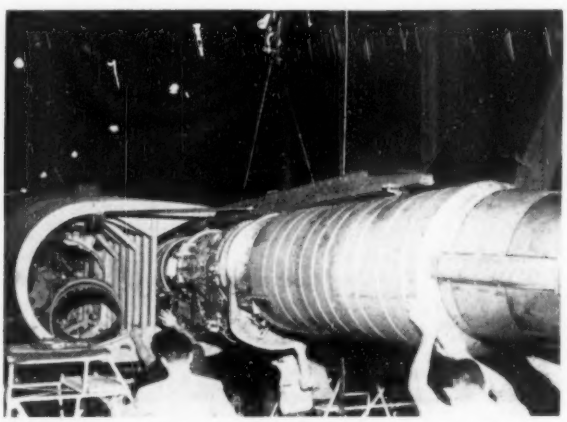
These first published pictures of Chance Vought Aircraft, Inc.'s F7U-3 Cutlass production line show some of the major assembly phases for this twin-jet, carrier-based fighter.

Other versions of the plane include a missile launcher (F7U-3M), photo-reconnaissance (F7U-3P) and ground attack (A2U-1) planes.

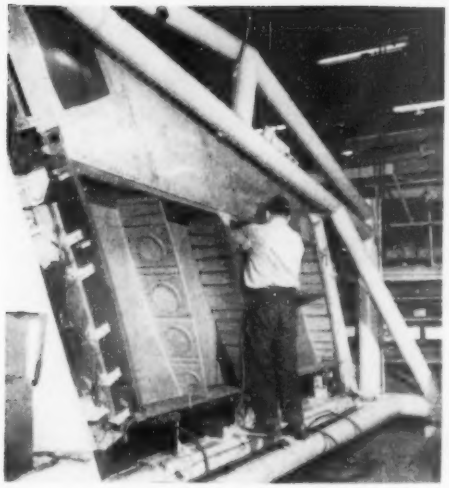
Now being delivered to the Navy for fleet operation, the F7U-3 is rated in the more-than-650-mph. class. It is powered by Westinghouse J46 turbojets fitted with afterburners.

To facilitate stowage aboard carriers, the plane's outer wing panels fold along a hinge line located just outboard of the two fins which tower above the airfoil trailing edge.

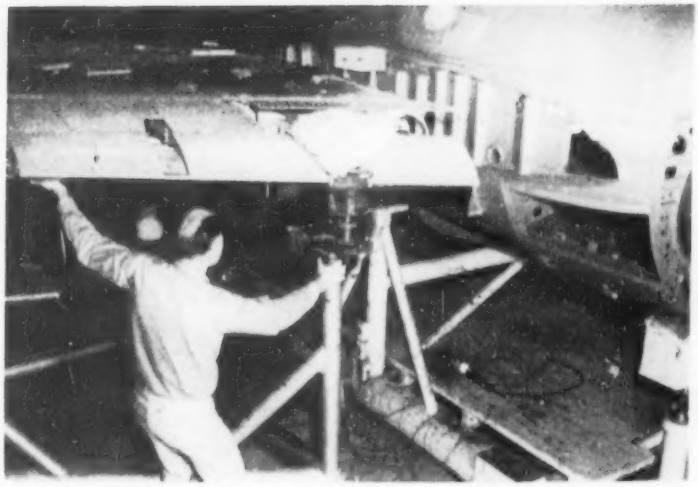
FUSELAGE CENTER SECTION, looking forward, reveals large bays in which electrical wiring and fittings are being installed. An aft fuselage section will attach to bulkhead framing workers.



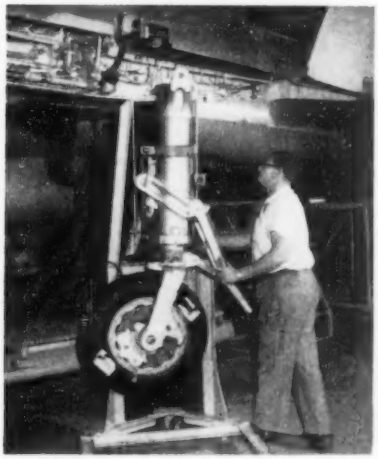
TURBOJET WITH AFTERBURNER, one of two Westinghouse J46s powering the Cutlass, is slid into place in fuselage. Afterburner shroud now is being built from RC-70 titanium.



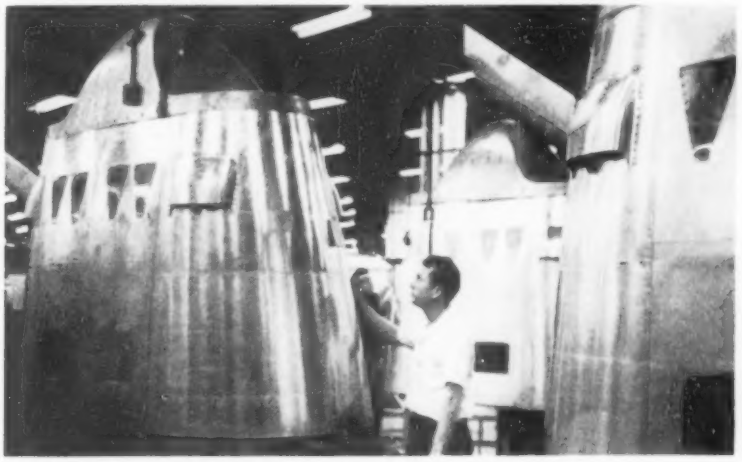
WING PANEL held in jig in sub-assembly shows long chord. Leading edge section is decked, open part shows stamped, builtup ribs.



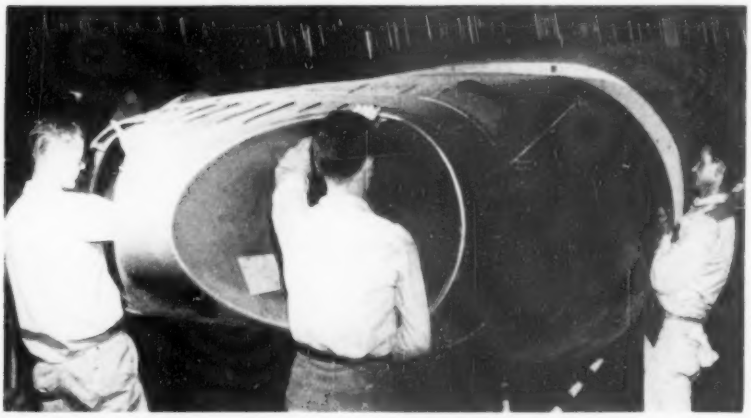
WING-FUSELAGE JOINING operation shows wing stub on dolly being wheeled up to center section of Cutlass body for hookup. Visible is wing stub's leading edge slat and air inlet passage behind fuselage's wing root area.



LANDING GEAR is dollied into place for bolting to wing structure. This job is done when plane is far along the line.



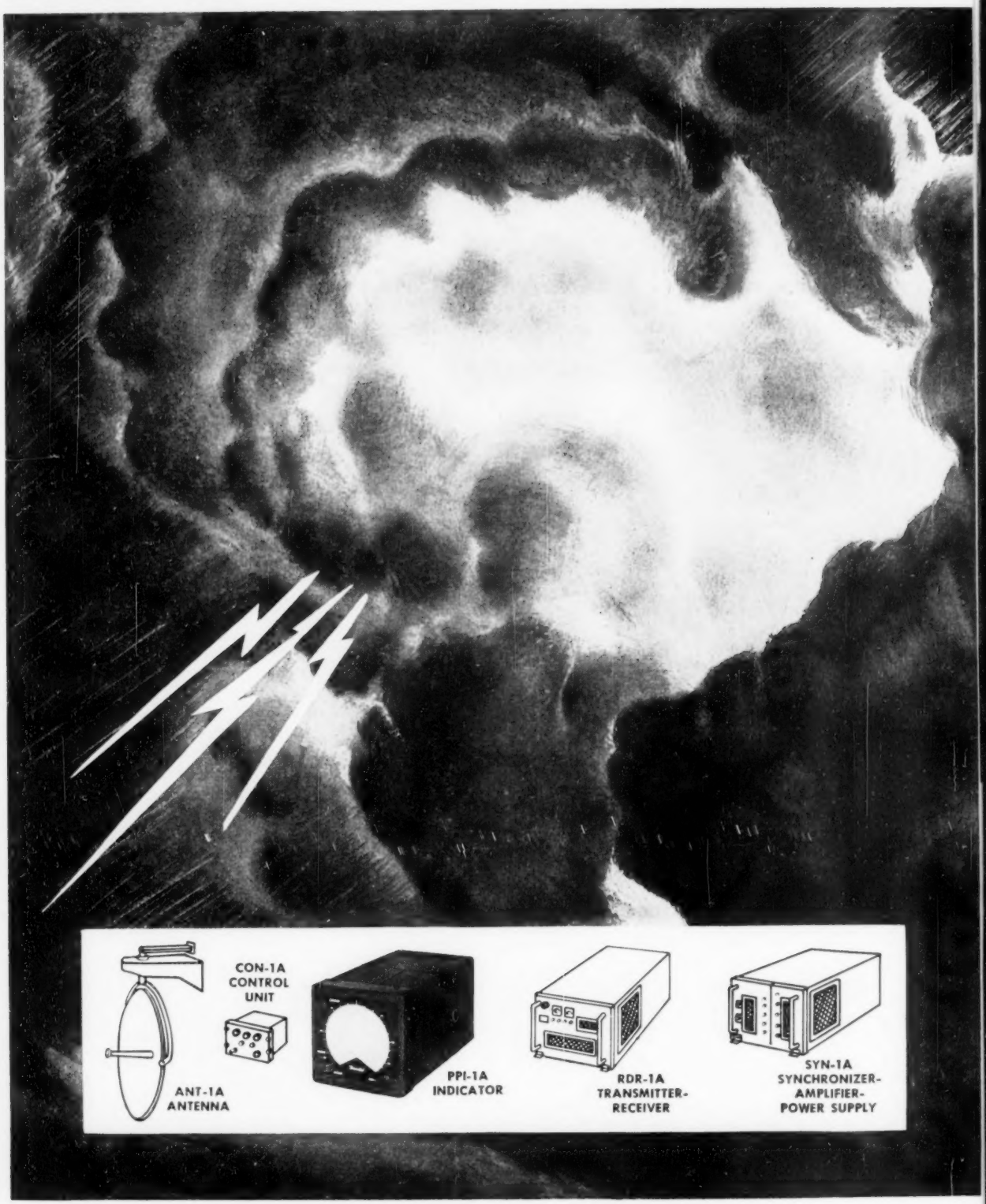
TAILCONE houses dual afterburner exhausts, has separating stinger at end. Fin-like arm, seen near top of unit at right, serves for jettisoning gasoline, while scoop at arm's base is part of arrangement for cooling afterburner on the J46.



EXHAUST OPENINGS gape at end of tailcone as it is lifted into place for attachment to aft fuselage. Stinger between two exhaust openings has been considered for fabrication from titanium. Fuel-jettisoning arm, cooling scoop are seen at right.

HUGE FIN is suspended in slings as it is fitted in place for connection to wing stub. Rudder is yet to be installed.

NOW IT'S BENDIX



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Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Aero Supply Mfg. Co., 611 W. Main St., Corry, Pa., strainer, screen assys., $32,484.

Air Associates, Inc., Teterboro, N. J., maintenance parts for actuators, $26,752.

Airborne Accessories Corp., 1414 Chestnut Ave., Hillside 5, N. J., actuators for aircraft, $71,562.

AiResearch Mfg. Co., div. of the Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., items and spare parts for valves, $116,665; regulator assy.; air fuel cell, 202 ea., $52,659; oil cooler, 535 ea., $258,229; items of retrofit kits, $166,823.

Aluminum Div. of Atlantic Steel & Iron Co., Inc., Page Blvd. at Shaw Lane, Springfield, Mass., tubing, aluminum alloy, 39,160 lb., $42,285; aluminum alloy, 81,000 lb., $31,752.

American Phenolic Corp., 1830 S. 54th Ave., Chicago 50, Ill., cable, coaxial, $44,939.

Atlas Paint & Varnish Co., 32-50 Buffington Ave., Irvington 11, N. J., enamel, synthetic gloss, $36,039.

Breeze Corp., Inc., 41 South 6th St., Newark 7, N. J., actuator, 32 ea., $38,351.

Bruning Brothers, Inc., 4209 E. Chase St., Baltimore, Md., paint; titanium, lead, zinc and oil, 98,997 gal., $214,823.

Delco Products, div. of General Motors Corp., Dayton 1, Ohio, dampers, $109,976.

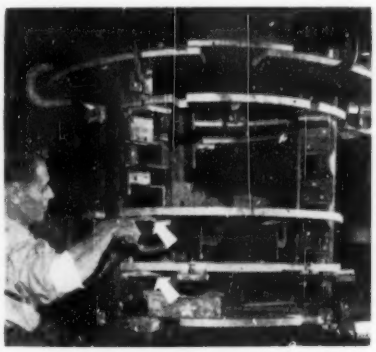
Dixie Paint & Varnish Co., Inc., P. O. Box 256, Brunswick, Ga., paint, interior, flat, wall, 68,995 gal., $74,515.

Eastman Machine Co., 779 Washington St., Buffalo 3, N. Y., screwjacks, actuators, spares, $82,544.

Goodyear Tire & Rubber Co., Inc., 1144 E. Market St., Akron, Ohio, brake assy., 169 ea., $34,726; 182 ea., $39,769.

Hardman Tool & Engineering Co., 1845 S. Bundy Drive, Los Angeles, Calif., headrest, seat, 2,879 ea., $27,984.

R. M. Hollingshead Corp., 840 Cooper St., Camden 2, N. J., coating solution, 20,000 gal., $40,340.



Cavity Filler

A saving of about $43,000 annually is being effected through the use of dental plastic instead of molten metal in fixtures at Consolidated Vultee Aircraft Corp.'s San Diego Div. The dental plastic is poured around assembly-fixture locater pads to maintain preset dimensions. The plastic is a flour-like substance which becomes doughy when mixed with water. Easily mixed and applied (arrows), it is shaped by hand and sets quickly. Convair reports that tests prove the material takes 11,500 lb. before cracking. Also, the expansion in the drying process is far less than that experienced with metal, the company says.

Hub Paint & Varnish Co., Inc., 47-38 Fifth St., Long Island City 1, N. Y., enamel, synthetic gloss, $36,696.

Iowa Paint Mfg. Co., Inc., 118-8th St., Des Moines, Iowa, paint; titanium lead, zinc and oil, 22,718 gal., $51,740.

Lite Mfg. Co., Inc., 101 W. 21st St., New York 11, N. Y., ground handling equipment for F9F aircraft, $31,017.

Lockheed Aircraft Corp., P. O. Box 551, Burbank, Calif., maintenance parts for WV-1 aircraft, $42,914.

Lowe Brothers Co., 424 E. Third St., Dayton 2, Ohio, primer, zinc-chromate, 40,970 gal., $102,425.

McDonnell Aircraft Corp., St. Louis 3, Mo., canopy assy., parts for F2H aircraft, 13 ea., $85,934.

Minneapolis-Honeywell Regulator Co., Aeronautical Div., 2600 Ridgway Rd., Minneapolis 13, Minn., indicator, fuel quantity, 168 ea., $32,666; power unit for P2V-5 aircraft, 252 ea., $61,690.

Motorola, Inc., 3102 N. 56th St., Phoenix, Ariz., radar beacon, power supply, $66,610.

Raytheon Mfg. Co., Government Contract Div., 100 River St., Waltham 54, Mass., delay line and spares for various aircraft, 113 ea., $49,164.

Scintilla Magneto Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., ignition components for various aircraft, $48,562.

United States Gauge Div. of American Machine & Metals, Inc., Clymer Ave., Sellersville, Pa., compass magnetic, 11,050 ea., $35,913.

Schwien Engineering Co., 16217 Lindbergh St., Van Nuys, Calif., indicator for various aircraft, 537 ea., $43,658.

Titanine, Inc., Morris & Elmwood Ave., Union, N. J., lacquer, cellulose nitrate, $60,197.

Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford 8, Conn., material for J57-P7 engine, 150 ea., $963,810; spare parts used on P&W engines, $28,176; spare parts used on P&W engines, 4 ea., $25,702; spare parts for P&W engines, $230,375; races and cams for P&W engines, $39,533; control for use on J57-P7 engines, 14 ea., $89,956; spare parts for use on P&W engines, $651,646.

Zac Lac Paint & Lacquer Corp., 350 Simpson St., N. W., Atlanta, Ga., lacquer, cellulose nitrate, $71,274.

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

Air Products, Inc., P. O. Box 538, Allentown, Pa., nitrogen generators, spare parts, 30 ea., $2,003,965.

Ampro Corp., 2835 Northwestern Ave., Chicago, Ill., spare parts, $233,410.

Boeing Airplane Co., Seattle, Wash., flight test program, kits, $209,332.

Consolidated Diesel Elec. Corp., P. O. Box 1353, Stamford, Conn., servicing unit, spare parts, kits, 940 ea., $17,904,160.

Curtiss-Wright Corp., Electronic Div., Carlstadt, N. J., trainers, engr. data, maint. data, 99 ea., $1,640,398.

Fairchild Camera & Instr. Corp., Robbins Lane, Syosset, L. I., N. Y., spare parts for aerial photograph cameras, $105,252; $57,289.

Frazier Wright Co., 2315 S. Hill St., Los Angeles, Calif., generator sets, diesel-elec., 3 ea., 3 ea., 36 ea., $1,108,969.

General Tire & Rubber Co., 1708 Englewood Ave., Akron, Ohio, wheel assys., data, 206 ea., $31,974.

LaCrosse Trailer Corp., 418 Gould St., LaCrosse, Wis., semitrailers, 80 ea., 6 ea., $161,010.

Lockheed Aircraft Corp., Marietta, Ga., repair of govt.-furnished B-47 aircraft, $35,108.

North American Aviation, Inc., Los Angeles Intntl. Airport, Los Angeles 45, Calif., F-100 mobile tr. unit, $495,000.

Remington Rand, Inc., Engr. Res. Associates div., 1902 W. Minnehaha Ave., St. Paul, Minn., spare parts and test equip. for AEDC data reduction systems, $279,369.

first aircraft hose using TEFLON*

HERE's the new Fluoroflex†-T hose assembly you've been hearing about — an amazing hose development that sets a new standard of service life.

This line has everything needed to beat the tough new jet engine plumbing problems. It has Fluoroflex-T (Teflon compound) tube, which is wholly unaffected by JP-4 fuel, aromatic fuels, MIL-L-7808 synthetic lubricating oils, and petroleum oils; and which permits a permanent fluid-seal at the fittings. It has compression type fittings that won't blow off (but can be readily field assembled) . . . and also a highly resistant stainless steel armor for 1000 psi working pressures for all hose sizes.

The most rigorous combination tests devised to evaluate performance prove that here at last are the products designed to eliminate frequent hose replacement.

Fluoroflex-T hose assemblies are also lighter and less bulky than any other aircraft hose assemblies. Get the complete story. Write for Bulletin FH-1.

*DuPont trademark for its tetrafluoroethylene resin. †Resistoflex trademark for products from fluorocarbon resins.

RESISTOFLEX CORPORATION

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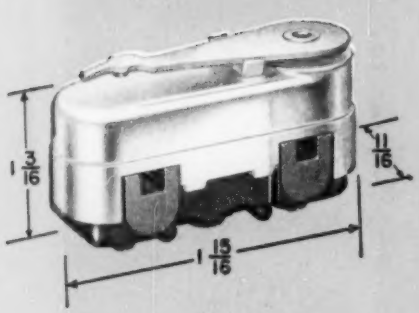
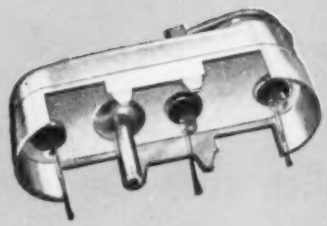
MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN

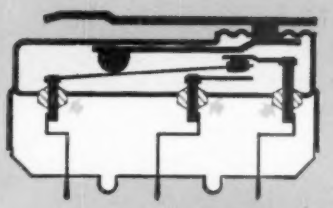
Why Aircraft Designers choose MICRO SWITCH Hermetically Sealed



MICRO SWITCH Hermetically Sealed Switch (shown above) is positively sealed against leaks of any kind. It is impossible for air, gas or spirit to leave or enter the enclosure. Long life and trouble-free operation are assured.



View with terminal block removed showing location of metal to glass seals for conductors to the switching chamber. (Tube is for evacuation of air and moisture and is sealed off after enclosure is filled with dry nitrogen.)



Cutaway view shows single pole, double-throw contact arrangement. Shaded portion indicates the sealed gas chamber. True hermetic seal is provided by glass to metal seal for conductors at points indicated by arrows.

MICRO SWITCH provides a true hermetic seal by glass to metal and metal to metal sealing

Hermetic sealing of MICRO SWITCH products is accomplished by the most modern methods to assure a true hermetic seal. This means glass to metal and metal to metal seals.

The sealing procedure assures that (1) the switch container is completely evacuated of all moisture and gases, (2) thoroughly tested for leaks of any kind and (3) filled with the exact amount of the proper gas for the most perfect switch operation.

MICRO SWITCH hermetically sealed switches have a d-c rating of 5 amperes motor load, 10 amperes inductive load, and 25 amperes resistive load at 30 volts d-c. Ratings are the same at any altitude. Minimum contact life on d-c current is 25,000 operations.

The switch is designed to conform to Military Specification MIL-S-6743. It is interchangeable with MICRO SWITCH Type "Z" pin plunger basic switches in most housings and actuators.

MICRO SWITCH engineering has pioneered in the development of many outstanding special switches to fulfill the rigid requirements of aircraft use. MICRO SWITCH engineers are specialists in solving aircraft switching problems. Their assistance is available without cost or obligation. You are invited to contact the nearest branch office for complete information on the MICRO SWITCH line.

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
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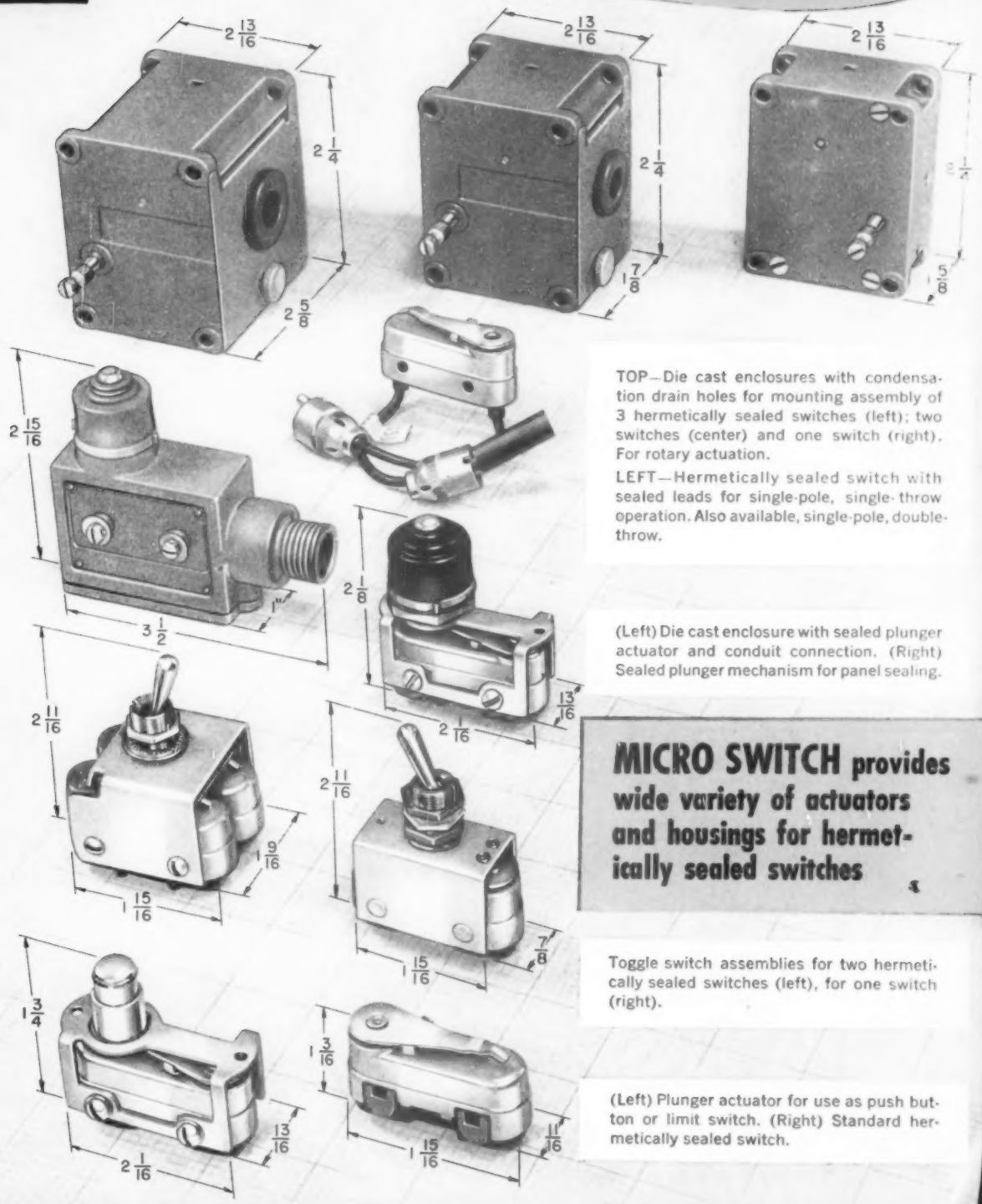
Switches for perfect operation under all environmental conditions



TOP—Die cast enclosures with condensation drain holes for mounting assembly of 3 hermetically sealed switches (left); two switches (center) and one switch (right). For rotary actuation.

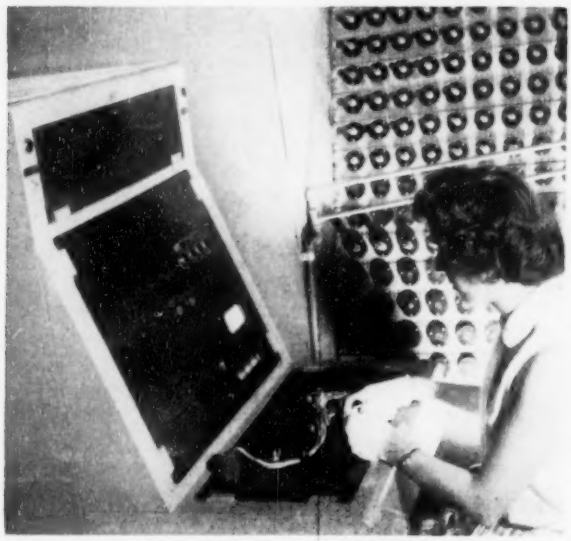
LEFT—Hermetically sealed switch with sealed leads for single-pole, single-throw operation. Also available, single-pole, double-throw.

(Left) Die cast enclosure with sealed plunger actuator and conduit connection. (Right) Sealed plunger mechanism for panel sealing.

MICRO SWITCH provides wide variety of actuators and housings for hermetically sealed switches

Toggle switch assemblies for two hermetically sealed switches (left), for one switch (right).

(Left) Plunger actuator for use as push button or limit switch. (Right) Standard hermetically sealed switch.



TUBE TESTS by manufacturers are not adequate to assure super reliable product needed to prevent an aborted guided missile mission.

MISSILE COMPUTER (such as NAA unit above) cannot tolerate failure of a single tube if it is to guide aerial weapon to distant target.

Missiles Impose New Hurdles for Tubes

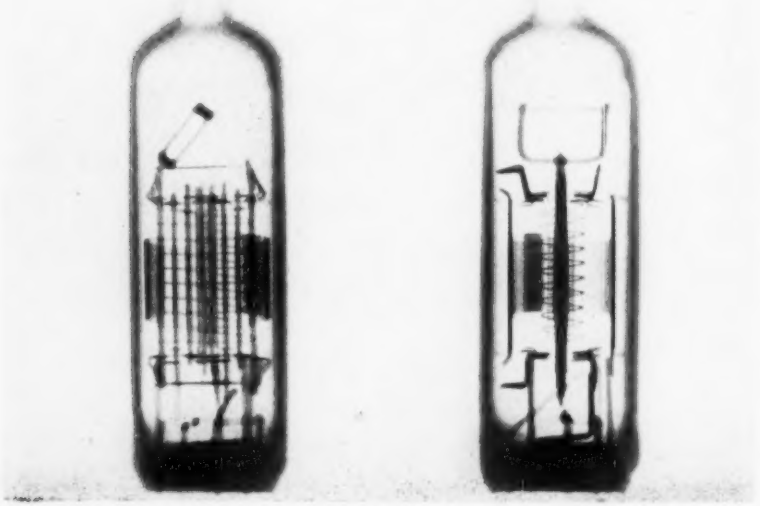
Statistical sampling techniques have enabled electron tube manufacturers to raise the average quality of the tubes they ship. But the military cannot afford to play a statistical version of Russian Roulette in guided missiles where a single tube failure practically assures an aborted mission.

Lacking a human crew to take over when equipment fails or to report on the malfunction after the mission, missiles demand a very much higher degree of tube reliability than do piloted aircraft.

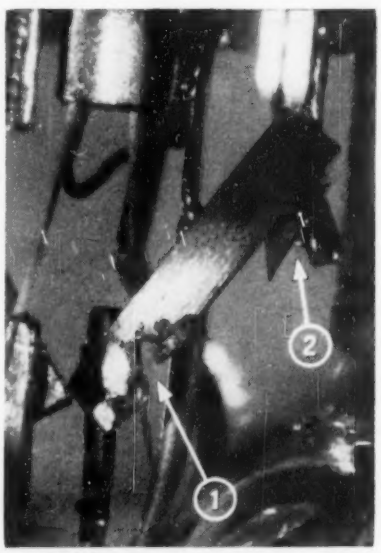
► **How to Get It**—Steps which two missile manufacturers, North American Aviation and Chance Vought Aircraft, are taking to get more reliable tubes were described recently by B. A. Kleinhofer, supervisor of electronics engineering at NAA's Downey plant, and R. E. Lanier, who is lead systems design engineer at CVA.

Kleinhofer's paper was delivered before an Institute of Navigation meeting in Los Angeles; Lanier's paper was given at the Sixth Southwestern Institute of Radio Engineers conference in Tulsa.

There is an old axiom that you can-



X-RAY PHOTO, used by North American's technicians to spot a tube's hidden internal construction flaws, is one technique adopted by missile makers to weed out the potential failures. Another test used by NAA is to examine all tubes under a microscope.



MISCROSCOPE easily shows up a tube's (1) burned support and (2) fragment from an unsuccessful attempt to weld support.

"ANGELS 40!"

Production and delivery of the new higher powered, rocket-firing Mark 4, CF-100 to the Royal Canadian Air Force is underway to equip squadrons at additional bases around Canada's vast territorial border.

With its radar tracking and fire control system, the Mark 4 can roam farther and exceeds the range of any other interceptor in the world. A CF-100 recently flew a 2100 mile R.C.A.F. non-stop mission in 3 hours and 50 minutes.

The role of this long-range, all-weather interceptor, powered by two ORENDA jets, also designed and built by AVRO Canada, is the defense of North America against attack through the Arctic. However, because of its inherent versatility, the CF-100 could be readily adapted to a variety of tactical operations.

"Angels 40!" in flight crew chatter means "get to 40,000 feet in a hurry". R.C.A.F. pilots report their CF-100's do that—in any weather, day or night.

AIRCRAFT DIVISION

A.V. ROE CANADA LIMITED

MALTON ONTARIO

MEMBER OF THE HAWKER SIDDELEY GROUP

CHANCE VOUGHT uses aging to get more reliable tubes for its Regulus guided missile.

not inspect quality into a product, or as Lanier expresses it: "No matter how many Fords you inspect, you'll never find a Cadillac." However, since missile manufacturers have no direct control over tube quality, they have no choice but to use inspection and test to weed out weak sisters.

Both NAA and CVA subject 100% of their missile tubes to inspection and test. North American goes one step further by employing microscopic, X-ray and polariscopic inspection to discover internal construction flaws which could lead to failure in rugged missile environment.

▶**Rejection Rates**—Each manufacturer has subjected more than 30,000 tubes to non-destructive electrical performance tests set forth in appropriate MIL (or JAN) specs. The CVA program has extended over three years, the NAA program over two.

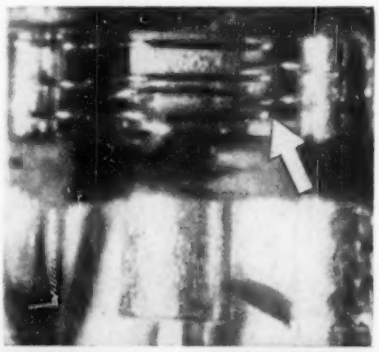
Electrical test rejection rates over these periods have averaged:

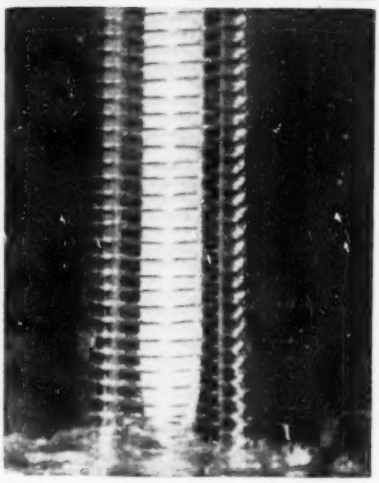
- **8% at North American.**
- **14% at Chance Vought.**

There are several explanations for CVA's higher rejection rate. Its program started earlier when there were few military (premium) tubes available. Over the past nine months, 10,800 military-approved tubes tested at CVA yielded a rejection rate of 9.6%, comparable to the NAA figure. However CVA is still forced to use some commercial-type tubes (for lack of premium-type counterparts) and 7,100 of these tested over the same period suffered a rejection rate of 18.8%, Lanier reported.

Another reason CVA's higher rejection rate: The company has continued to tighten test limits so that despite improved tubes its rate has remained essentially constant over the three-year period. CVA is currently testing premium tubes to limits which are 5% tighter at both ends than those specified in MIL-E-1B under which the tubes are procured. This is to compensate for inaccuracies in CVA test equipment.

▶**Graded for Use**—Tubes that survive North American's electrical performance tests are then subjected to physical inspection checks intended to disclose incipient faults. Some 66% of the original 33,000 tubes passed all these tests and were "blue coded" indicating that they are suitable for missile use.





ONLY A FEW cut grid wires on a submin tube were visible under a microscope (top) until the anode was removed, disclosing that half of the tube's grid wires had been cut.

The 26% which passed the MIL electrical performance tests, but which had construction flaws, are "yellow coded" for use in non-critical installations, such as in the lab for experimental equipment, where they will not encounter shock and vibration.

▶**Under the Microscope**—When tube innards are examined under a microscope, NAA finds many potential causes of failure, Kleinhofer indicated. Photographs of some of the rejects, viewed under a microscope, showed:

- **Partially melted** structural support for tube elements, apparently damaged during the welding process. The operator who assembled the tube had also made two attempts to weld supports to the tube elements, and a fragment of the first unsuccessful attempt was still attached. Kleinhofer said that such a fragment is tolerated only if it appears to be firmly anchored and has adequate clearance from other electrodes (see p. 34).
- **Poor bond** between tungsten heater wire and electrode to which it connects, evidenced by a lack of visual indication of wire being embedded in the element.
- **Damaged grid turns,** cut during process of assembly. Kleinhofer noted that only a couple of cut turns were visible on the particular tube shown, the rest being covered by the tube's anode. When the tube was disassembled, it was found that 29 out of 54 grid wires had been cut (see left). This and similar experiences have led North American to use X-ray inspection to supplement its visual microscopic test.

▶**X-Ray Inspection**—NAA X-rays each of its tubes in two positions, one with the element supports parallel to the plane of the film, the other with them perpendicular to the film. (X-ray views of a subminiature tube are shown on p. 34). To obtain maximum radiographic definition and contrast, North American had to experiment with such factors as distance to the X-ray source, exposure, type of film and X-ray voltage. However, Kleinhofer reported that with only 12 basic settings, NAA is able to accommodate a hundred different types of tubes, including octal, miniature and subminiature.

X-ray inspection results in as many tube rejections as visual microscopic procedures, Kleinhofer reported, showing that it pays its way.

▶**Polariscopic Inspection**—Military control specs check for stresses in the glass envelope on a sampling basis in which tube is alternately plunged into boiling and freezing water.

NAA finds this impractical for 100% testing, so it has substituted the use of a polariscope which employs polarized

the music goes round and round... but ...it can't come out here

Maxim jet silencer installation,
Douglas Aircraft, Long Beach, Cal.

MAXIM SILENCERS

Noise from a be-bop trumpet starts out weak — comes out strong . . . just the opposite from this dramatic silencing installation where the noise from the turbo jet comes in at tremendous intensities (loud enough to kill a man), yet winds up practically *noiseless.* That's the magic of Maxim silencing . . . a science pioneered by Maxim for over 30 years.

If your problem is silencing — consult Maxim, the undisputed leader in the science of silencing.

DR. SHUSH

OUTSTANDING MAXIM SILENCER INSTALLATIONS:

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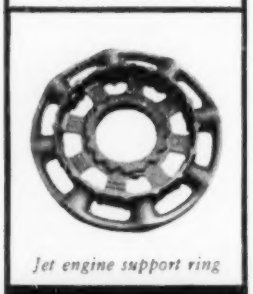
THE TESTED FORMULA FOR QUALITY STAINLESS CASTINGS

Supercharger diaphragm

Rocket valve body



Jet engine support ring

For sound castings of intricate design produced experimentally in small lots or mass produced by the thousands and tens of thousands . . . the aircraft industry has come to rely on COOPER ALLOY.

Whether the job requires molding in sand, spinning in metal molds, or casting in resin bonded shells, Cooper Alloy offers the latest in technical knowledge, the most advanced equipment and a spirit of pioneering leadership that has kept it attuned to the ever-changing needs of the aircraft industry.

Bulletin CC54 will give you a clearer picture of our facilities, our experience and our know-how. Write for your copy today.

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Los Angeles, San Francisco, Oakland, Houston, Chicago, Detroit, Philadelphia, Hartford
Leading producers of STAINLESS STEEL valves, fittings and castings

light to show areas of high stress concentration. The technique is described in a Bell Telephone Labs paper released through the Radio-Electronic-Television Manufacturers Assn. on Mar. 9, 1951 ("A Method for Measuring Strain in Side Walls of Glass Bulbs and Completed Tubes").

► **Putting Data to Use**—North American is analyzing the reasons for rejection on tubes which fail to pass electrical performance tests and the frequency of rejection for specific causes. The resulting information is then forwarded periodically to tube manufactures and the Military, Kleinhofer says.

In addition, the blue and yellow coded tubes are serialized so that if and when they fail, the type failure can be correlated with initial inspection data.

Tubes that fail in service are returned to an engineering group for examination to determine cause. Object is to determine what additional things to look for during the initial inspection to prevent future failure.

► **Tubes Getting Better**—Thanks to improved tube quality and the new premium-type tubes, Kleinhofer reports that reject rates are going down. During December, NAA tested 6,600 tubes, found 77% flawless (blue code), compared to the 66% average for the previous two years. In one batch of submin tubes, the flawless yield was 87%, Kleinhofer reports.

Kleinhofer concludes that microscopic inspection, which is required in military acceptance specs for premium submin tubes, should also be employed for miniature and octal types, and that X-ray inspection for all types may be desirable.

► **Tube Aging at CVA**—Chance Vought is currently aging its high-vacuum tubes for 100 hours, including burn-in time at the tube factory, at operating voltages they will meet in actual use.

CVA has found little difference in tube failure rates when tubes are given a longer aging period, but a significant difference if burn-in is shortened to 50 hours. However, with higher-quality tubes now coming along, Lanier says that CVA hopes to shorten the aging period to 50 hours. Gas tubes are given a 24-hour burn-in.

► **Good Lots and Bad**—CVA has found that individual batches of tubes will either have a rejection rate below 25% or above 50%. When rates run 50% or more, the tubes in the batch which do pass tests limits are normally close to the ragged edge, Lanier says. As a result, CVA decided to scrap all tubes in a given lot when the rejection rate exceeds 30%, and with improved-quality tubes has recently cut the figure to 20%.

To save time which would be wasted in testing all tubes in a bad lot, CVA uses a sampling plan to detect defec-

tive tube batches, with a certainty of 0.95, Lanier reports. For example, in a 500-tube lot, if five of the first 10 tubes tested are rejected, the entire lot is automatically rejected. Lots with less than the critical percentage of rejects will be 100% tested, although the entire lot subsequently may be rejected, Lanier says.

► **Missile Manufacturer's Philosophy**—Lanier undoubtedly spoke for all missile manufacturers when he said that "Chance Vought Aircraft conducts a tube-processing program, not to compete with the tube manufacturer, but because we have to . . . in order to obtain the desired quality.

"The effectiveness of . . . (this) program has been reflected in the high reliability of our Regulus guided missile. If it were possible to obtain that reliability without our processing tubes, we would be happy to conclude the program today."

—Philip Klass

New Avionic Devices Are Put on Market

A variety of new components and devices suitable for avionic use, which have recently been announced, include:

• **Printed Circuit Connectors, "PC"** series, for direct connection to printed circuit boards for maximum space economy, are available with up to 44 contacts and polarization provisions to assure proper connection. New units are available with three different types of insulating material from: Electronic Sales Div., DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City, N. Y.

• **Lightweight Resistors,** Type "P", of the precision encapsulated wirewound type, are now available in all MIL-R-93A lug-type styles as well as several RB52 axial-lead types, in commercial wattage ratings to 3.5 w for 125C operation. Resistor bobbins and encapsulating coatings are made of same resin, enabling units to withstand temperature cycling more severe than called out in MIL specs, according to manufacturer. Bulletin L-30 gives added information. Shallcross Manufacturing Co., Collingdale, Pa.

• **Molded Tubular Capacitors,** paper type, designed to withstand severe environmental conditions, can be operated at 150% of rated voltage for 250 hr. at 85C, manufacturer says. New units, called Tropicaps, are available in standard sizes and ratings, described in Bulletin 106, available from: Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y.

• **High Temp Transformers,** designed for 175C operation, use molded open-type construction to provide up to 50% weight saving, according to manufac-

AERONAUTICAL ENGINEERS

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STAINLESS STEEL FASTENINGS BY ANTI-CORROSIVE

because

1 **RESISTANCE TO CORROSION AND HEAT!** Plus greater strength, longer life, low temperature ductility, non-magnetic and anti-seize qualities! Precision made to conform to aircraft specifications!

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Write for FREE Product List 54J — lists complete range of items, sizes and analyses available from stock or by special order.

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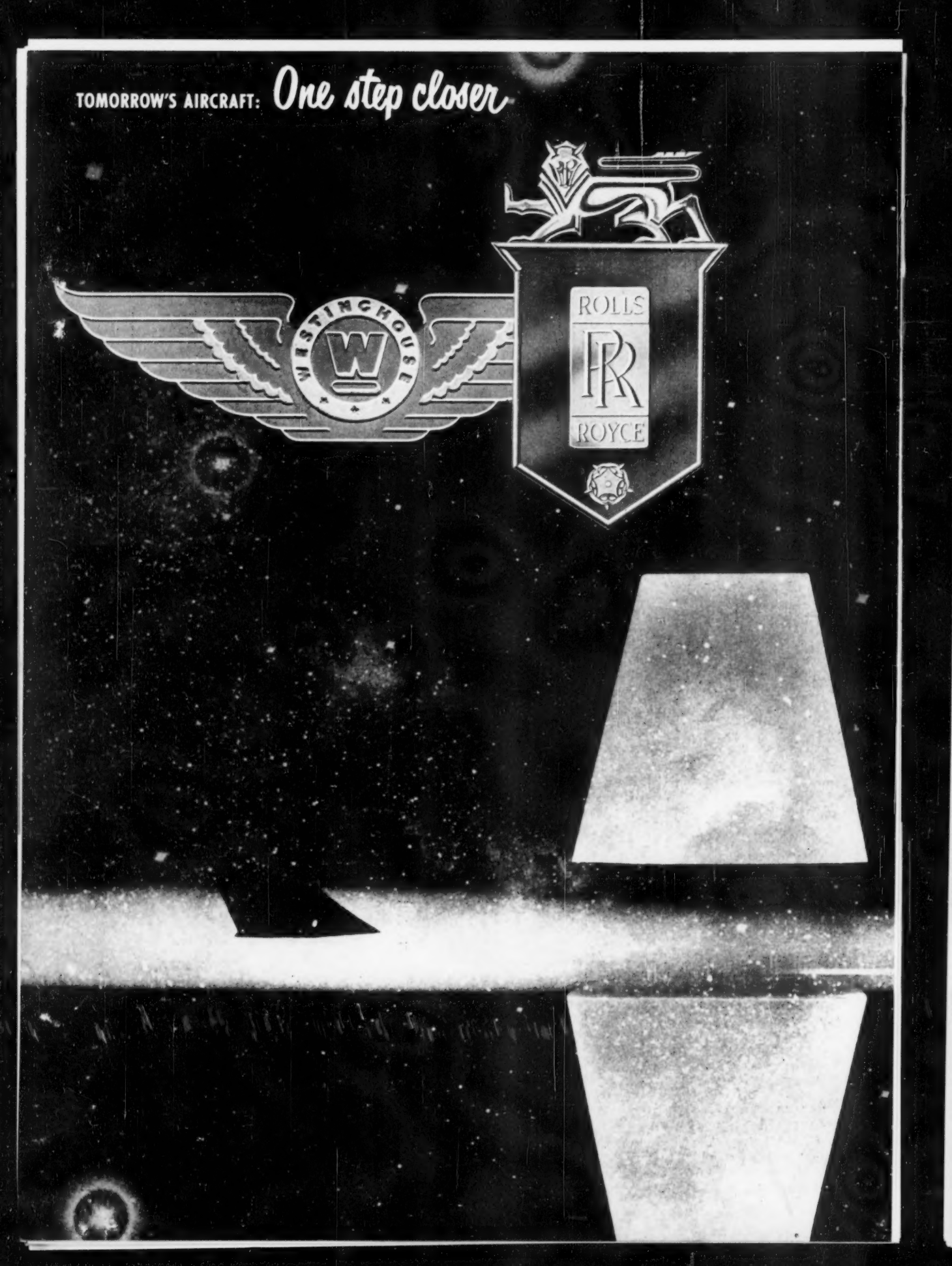
ANTI-CORROSIVE METAL PRODUCTS CO., INC.
Castleton-on-Hudson, New York


TOMORROW'S AIRCRAFT: One step closer
WESTINGHOUSE
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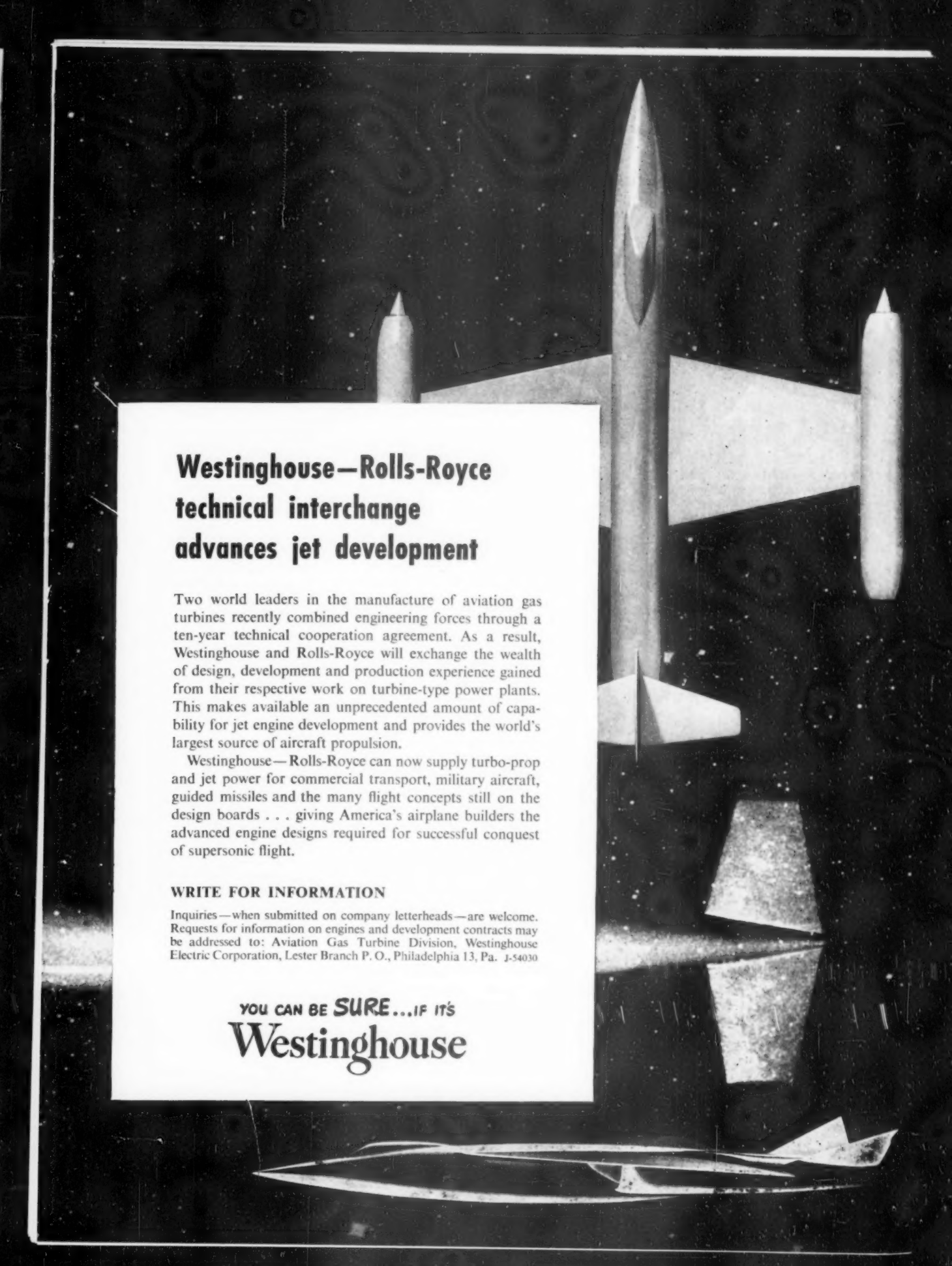


Westinghouse—Rolls-Royce technical interchange advances jet development

Two world leaders in the manufacture of aviation gas turbines recently combined engineering forces through a ten-year technical cooperation agreement. As a result, Westinghouse and Rolls-Royce will exchange the wealth of design, development and production experience gained from their respective work on turbine-type power plants. This makes available an unprecedented amount of capability for jet engine development and provides the world's largest source of aircraft propulsion.

Westinghouse—Rolls-Royce can now supply turbo-prop and jet power for commercial transport, military aircraft, guided missiles and the many flight concepts still on the design boards . . . giving America's airplane builders the advanced engine designs required for successful conquest of supersonic flight.

WRITE FOR INFORMATION

Inquiries—when submitted on company letterheads—are welcome. Requests for information on engines and development contracts may be addressed to: Aviation Gas Turbine Division, Westinghouse Electric Corporation, Lester Branch P. O., Philadelphia 13, Pa. J-54030

YOU CAN BE SURE...IF IT'S

Westinghouse

turer. Transformers are designed to MIL-T-27 specs, including Grade 1 humidity tests. Sterling Transformer Corp., 297 N. 7th St., Brooklyn 11, N. Y.

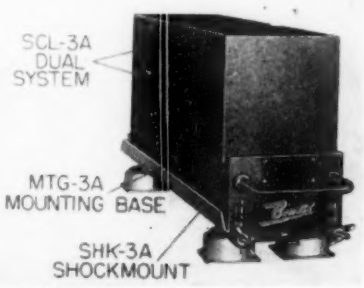
• **Tiny Precision Pot.** 7/8-in. dia., weighing only ½ oz. uses precious metals in its construction, including a gold alloy take-off brush. New D-100 units are available with resistances up to 50,000 ohms, with linearity of ±1%, up to 360-deg. rotation. Resistance material has temperature coefficient of 0.00002 parts/deg. C for values of 500 ohms or more. Unit may be operated at ambient temperatures of −67F to 250F. Manufacturer is Jet Electronics Inc., 93 Mass. Ave., Boston, Mass.

Two Firms to Build Airline Selcal Units

Motorola and Bendix Radio have moved quickly to meet airline interest in Selcal, new selective calling system which enables a ground dispatcher to ring a buzzer and flash light in cockpit of a specific airplane to which he wants to talk, relieving flight crew of continuously monitoring its receivers (AVIATION WEEK Nov. 16, p. 61).

Motorola's Communications and Electronics Division, which calls its equipment "Quick-Call," announced it has received Civil Aeronautics Administration approval of its system. Bendix says it will soon begin marketing its unit, the SCL-3 Selective Calling System.

MOTOROLA ground dispatcher's selector panel permits ground operator to "buzz" any individual aircraft to which he wants to talk.



BENDIX airborne decoder flashes cockpit light and rings buzzer when it is triggered.

• **Motorola.** Push-button calling on new Motorola dispatcher's console (see photo) transmits two dual-tone pulses over regular HF or VHF transmitter. More than 1,400 different combinations (codes) of tones are available, with each aircraft assigned an individual code. Dispatcher can change code of individual aircraft call units (five shown) at will.

The Motorola airborne decoder weighs 13 lb., has dual channels for use with two receivers, or can be obtained with single channel. When its specific code is received, unit flashes cockpit light, rings buzzer. First of Motorola Selcal units is now in use on Pan American's Fiji-New Zealand route, has CAA approval.

• **Bendix Radio Selcal,** both the airborne decoder (photo) and the associated dispatcher console, are operationally similar to the Motorola system.

Both are designed to the basic spec (characteristic) drawn up by Airlines Electronic Engineering Committee of Aeronautical Radio, Inc.

Airborne decoders cost approximately $500 to $600.

Engineered for
Extreme
Efficiency

the NEW AN-E

Environment Resistant Bendix Electrical Connector

The challenge to protect sensitive airborne electronic circuits from thermal shock, surface condensation and extreme vibration has been successfully met by Bendix engineers in this new spaced grommet "E" connector.

This connector is not only designed for performance, but is also engineered for your production needs. The open space in the solder-well area provides ample room for all assembly and soldering operations. Moisture-proofing is accomplished without the use of potting compounds, permitting completely serviceable aircraft harness installations.

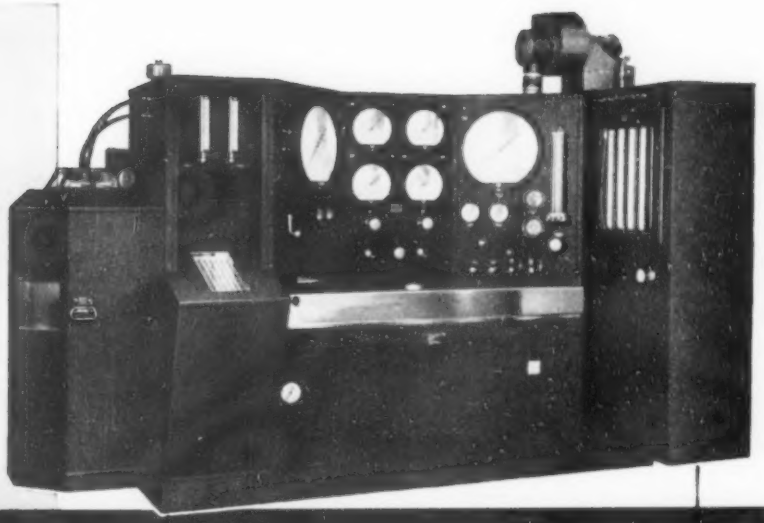
These features are all accomplished with no appreciable increase in weight over an AN-A/B connector with a cable clamp.

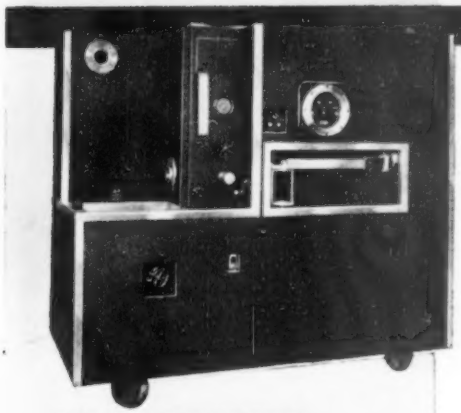
Complete information on request.

Bendix
SCINTILLA DIVISION of Bendix
SIDNEY, NEW YORK
AVIATION CORPORATION

COX TEST STANDS

STAND THE TEST OF TIME!





THE 309 FLOWMETER CALIBRATING STAND

More precision flowmeters are calibrated and checked on Cox Calibrating Stands of which the Type 309 is the latest, than on any other stand used by the automotive and aircraft industries. A precision-weighing mechanism weighs the flow through the flowmeter being tested, assuring precise calibration of the instrument. Portable Cox Calibrating Stands will accommodate single or multiple stage flowmeters of any make.

Other CRL *Products*

- **Single and Multiple Stage Flowmeters**
- **Engine Indicators**
- **Magnetic Thickness Gages**
- **Balanced Electronic Equipment for Measuring Pressure and Vibrations**
- **Vibration Study and Recording Equipment**

TYPE 416 UNIVERSAL FUEL NOZZLE TEST STAND

Used by the aircraft industry to test for optimum efficiency of jet fuel nozzles, this highly accurate Cox Test Stand is a "complete modern hydraulics laboratory." Pressure, temperature, and flow rate can be controlled during testing to simulate the actual conditions under which jet fuel nozzles normally operate in the engine.

• When automotive and aircraft manufacturers first encountered the problem of determining in advance how certain engine accessories would perform under actual operating conditions, Commercial Research Laboratories engineers developed special test stands which would supply this information.

To test for optimum efficiency of jet fuel nozzles, for example, the nozzle is mounted in a Cox Nozzle Test Stand in which temperature and pressure are controlled and fuel is passed through the nozzle at the rate required. The fuel is automatically weighed by an electronic weighing device within the test stand and from this information the nozzle rate of flow is computed.

Cox precision-weighing Calibrating Stands are equally indispensable to automotive carburetor testing since the flowmeters which are used to measure the exact flow rate must themselves be calibrated and regularly checked on these portable, highly accurate stands.

Despite the difficult tasks these and other Cox test stands are called upon to perform in helping industry to solve complex testing problems, they have built up an outstanding record of many years of dependable service and performance.

Write us for descriptive literature and complete details on these and other Cox Test Stands — including Air Flowmeters and Carburetor Flow Stands.

Commercial Research Laboratories, Inc.

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Makers of REGISTERED TRADE MARK *Since 1912*

Call in Parker for faster service on engine accessories for hot-air systems

"When you call in Parker for engine accessories, we can offer fast service on everything from proposals to shipments," explains R. P. MacDonald, Parker sales engineer. He continues . . .

"Let me briefly describe these accessories for engine *hot-air* systems, from left to right. Our shutoff valve and pilot valve, used in nozzle cooling, are both extremely simple in design. The butterfly valve can operate at 500°F ambient and handle air up to 700°F.

"Shown on the right-hand page, our anti-icing and de-icing valves help keep an engine's air-intake section free from ice. Each can handle air up to 600°F. With seal modification, the de-icing valve will carry air up to 900°F. The motor-actuated shutoff valve assembly, shown on the far right, is available with rotor, butterfly, shear-plate, or poppet construction.

"Parker has centralized all engine-accessory engineering and manufacturing into a single operating division. Here you'll find engineers working to design accessories that offer not only extra performance benefits but also cost savings. Because quality depends largely upon precision manufacturing, you'll also find we use the most advanced manufacturing techniques and many one-of-a-kind machines. And, the inspections and tests that each accessory must pass prove Parker customers get what they order.

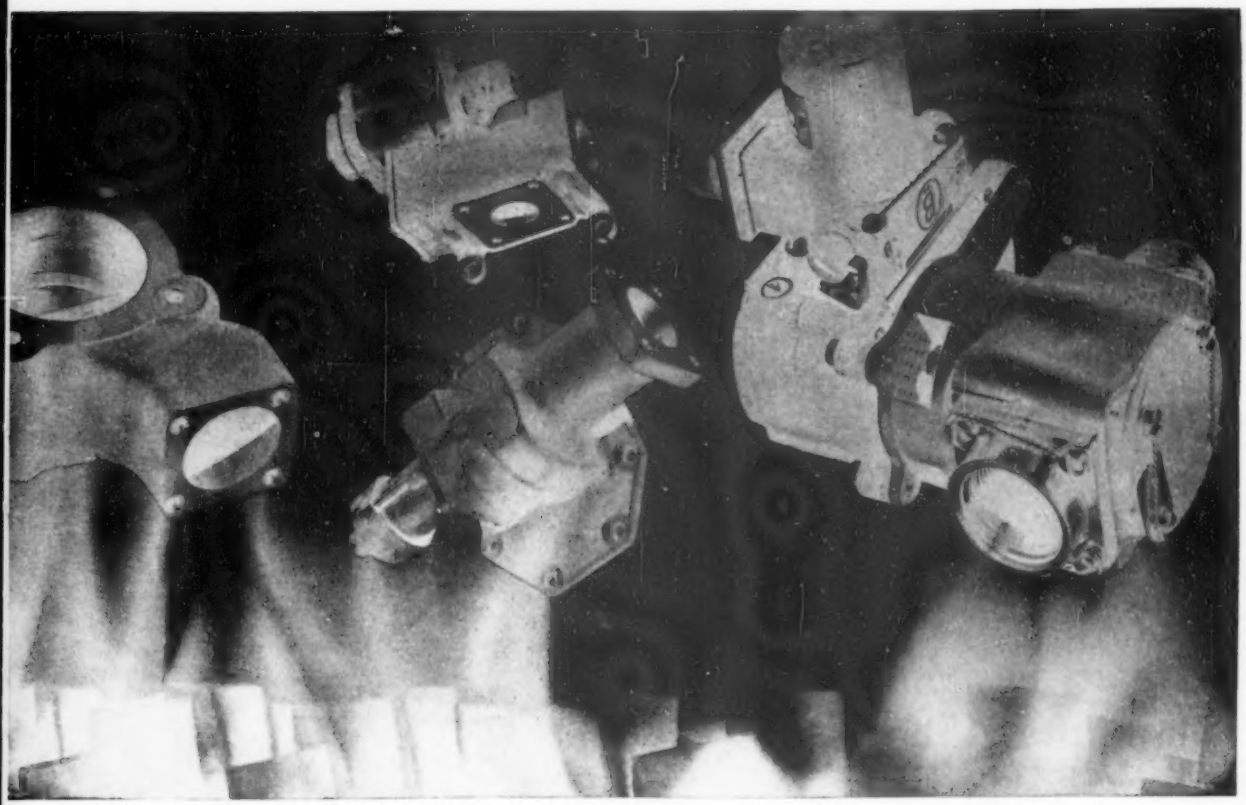
"Having a specialized group of customers, we are able to gear these facilities to a faster, more streamlined way of doing business.

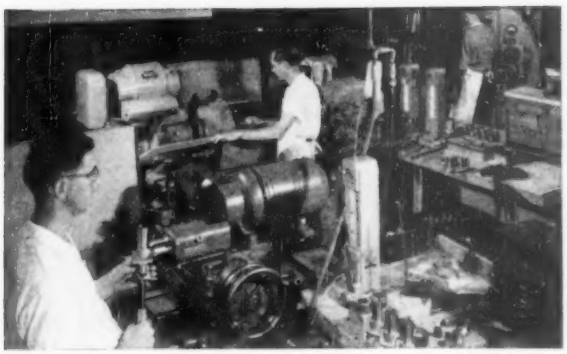
"Whether you are interested in engine accessories for *hot-air* systems or for *fuel* or *hydraulic* systems, why not call us in? We'll be glad to discuss your requirements and offer assistance."

ENGINE ACCESSORIES DIVISION
The Parker Appliance Company
17325 Euclid Avenue, Cleveland 12, Ohio

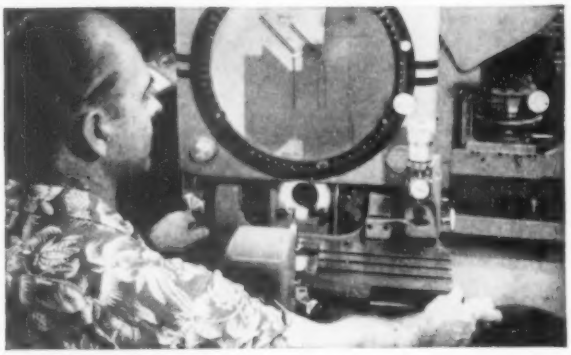
Parker

Hydraulic and fluid
system components

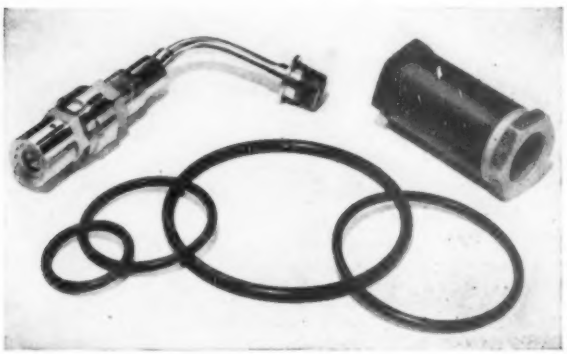




Precision grinding (shown above) on these stainless steel parts is checked to within 0.0001-inch accuracy. Grinders are able to hold 0.0002-inch concentricity between diameters.



Inspections prove quality. Every accessory is 100% tested and inspected. Here's an optical comparator in use. We maintain close customer liaison to correlate test methods and results.



Look at these other Parker products: nozzle and check valve represent accessories for engine *fuel* and *hydraulic* systems. Also, Parker O-rings are approved for *all* military applications.

THE PARKER APPLIANCE COMPANY
Section 301-C
17325 Euclid Avenue
Cleveland 12, Ohio

☐ Please send me your new 24-page booklet about all types of Parker engine accessories, Bulletin 133081.

☐ O-ring catalog No. 5100.

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Send for new brochure. It's a 24-page picture tour of Parker's Engine Accessories Division, showing its products, plus unusual engineering, manufacturing and test equipment.

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You don't need one when you use

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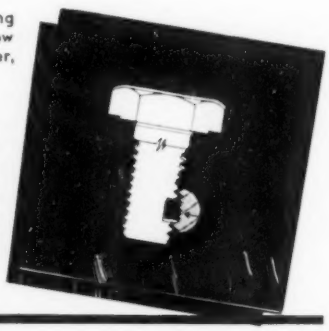
ONE-PIECE

Self-locking bolts and screws that eliminate safety wiring . . .

Stop wasting time and money on intricate and complicated safety wiring! Use NYLOK self-locking screws and bolts. They lock themselves in any position, seated or unseated . . . no other parts needed. They assure positive, vibration-proof locking without galling, distortion or mutilation of threads or seating surfaces. The resilient nylon insert provides the wedge that locks. It's always there, can't be left out or forgotten and may be safely re-used many times.

So cut costly assembly time, eliminate extra safety-wiring labor and materials by using NYLOK self-locking screws and bolts. When you use NYLOK, you don't need drilled-head screws and bolts because NYLOK screws and bolts lock themselves!

● Let NYLOK engineers solve your fastening problems. Tell us about them and we'll show you how NYLOK will do the job faster, easier . . . and cheaper!



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Resilient nylon plug (A) sets up lateral thrust, smoothly wedging mating threads together (B). All of locking action is on the threads; head is not stressed. Locking is positive, seated or unseated. Provides leak-proof seal where liquids are involved.

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Manufacturers of Nylon-Locked fasteners covered by U.S. patents and patents pending

Main Offices and Factory — Elmira Heights, N. Y.

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New Accelerometer Balances G Torque

A tiny servo system generates current to counterbalance torque produced by acceleration in a new servo accelerometer announced by Donner Scientific Co. This countercurrent enables the accelerometer to measure to four significant figures.

Donner's new device comes in two models, one for linear and the other for angular accelerations. Error due to friction is said to be 0.0002G, output proportionality is within 0.1%, and frequency response extends to 100 cps., or less if desired.

Additional details are presented in company's Bulletin DSA-1. Donner's address: 2829 Seventh St., Berkeley 10, Calif.

FILTER CENTER

▶ **Bendix Airborne Radar Test**—Bendix Radio has reportedly completed plans with a major U.S. international air carrier to test the prototype model of its X-band (3.2 cm.) weather warning radar this summer.

▶ **New UHF Transmitting Tubes**—RCA has announced two new lightweight UHF "pencil" triodes suitable for use in airborne transmitters at altitudes up to 60,000 ft. The units are the first of the RCA pencil tubes to feature external cooling radiators, giving them a maximum plate dissipation of 13 watts. The new 6263, intended for use as an RF power amplifier or CW oscillator, has an amplification factor of 27. The 6264, intended primarily for use as a frequency multiplier, has a mu of 40.

▶ **Northwest Tries Remote VHFs**—Northwest Orient Airlines is now operating remote VHF stations on its Chicago-Minneapolis routes with stations at LaCrosse (Wis.) and Rochester (Minn.) tied into its Minneapolis center by telephone line. This permits direct VHF contact throughout most of the Chicago-Minneapolis leg. Northwest is using Collins Radio RC-101 system, which allows up to four unat-

tended stations to be operated. Each of the three stations in the network operates at the same nominal frequency (131.9 mc.) but with a 10-kc. separation to avoid interference.

▶**Bendix Ships First DMEs**—Bendix Radio has delivered the first of its civil airborne DMEs and reports a backlog of $250,000 in DME orders. One of the first Bendix sets will go into a plane owned by Fruehauf Trailer Co. Bendix recently completed its first DME factory-training program.

▶**MDE-MPE Service Tests**—Navy is getting ready to service test a quantity of sonobuoys constructed with its new MDE-MPE ("Tinkertoy") technique.

▶**New Radome Material**—Streamlined radomes which permit microwave transmission at any angle of incidence without changing polarization, and with or without change of direction, whichever is desired, can be made using a new wall construction (type "B") developed by McMillan Laboratories, company reports. Type B construction is a sandwich of thick low-dielectric skins with a thin high-dielectric core, which McMillan says has proven extremely rugged. Company's address is 28 Central St., Ipswich, Mass.

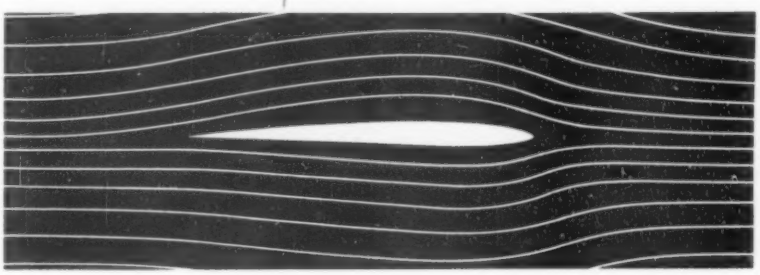
▶**Gen. Craigie To Speak**—Lt. Gen. Lawrence Craigie, USAF, will deliver keynote address at the Symposium on Automatic Production of Electronic Equipment, Apr. 19-20, at the Fairmont Hotel, San Francisco. The symposium, first of its kind on the West Coast, is sponsored jointly by Stanford Research Institute and USAF.

▶**Britain Buys Decca Radars**—British Ministry of Supply has ordered an undisclosed number of the low-cost Decca 424 airfield control and approach radars, for Royal Air Force use (AVIATION WEEK Jan. 11, p. 43). The contract calls for air transportable versions for quick set-up in forward airfields.

▶**Printed Connector Soon**—General Electric will soon announce production plans for miniature printed connectors, designed to mate directly with printed-circuit boards. Plans will include licensing of a major connector manufacturer as a second source. Originally called Novacon, device has been renamed "Print Wire Connector." GE spokesman says decision to go ahead resulted in part from flood of inquires which followed AVIATION WEEK'S Nov. 10, 1952, story based on a paper delivered at the National Electronics Conference. Device will be marketed by company's Components Dept., Electronics Div., Syracuse, N. Y. —PK

Lockheed in California calling

AERO-DYNAMICISTS *and* **AERO-DYNAMICS ENGINEERS**



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nuclear energy
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continuing development of the Super Constellation and other production models

These career positions have been created by Lockheed's program of diversified development – a program that means more scope for your ability and more opportunity for promotion because it *is* diversified.

In addition to more opportunity, you receive

increased pay rates now in effect
generous travel and moving allowances
the chance for you and your family to enjoy life in Southern California

Lockheed invites qualified aerodynamicists and aerodynamics engineers to apply for these positions. Coupon below is for your convenience.

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Dear Sir: Please send me an application form and illustrated brochure describing life and work at Lockheed in California.

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USS Carilloy passes rigid

THESE HIGH QUALITY aircraft propeller hubs are forged and machined from semi-finished Carilloy 4340. They meet extremely tough magnaflux requirements.

FOR BIG PROPELLERS, 2 forged sections (**a**) are welded together to form one blade thrust member. Pieces are then ground and magnafluxed. Kellered, ground, and magnafluxed again (**b**). Mill camber sheets (**c**) then are copper brazed to the thrust members. Entire unit is heat treated and polished before final magnaflux test and cadmium plating. Rigorous magnaflux testing assures that every finished blade (**d**) can withstand the tremendous stresses encountered on the latest high-speed planes.

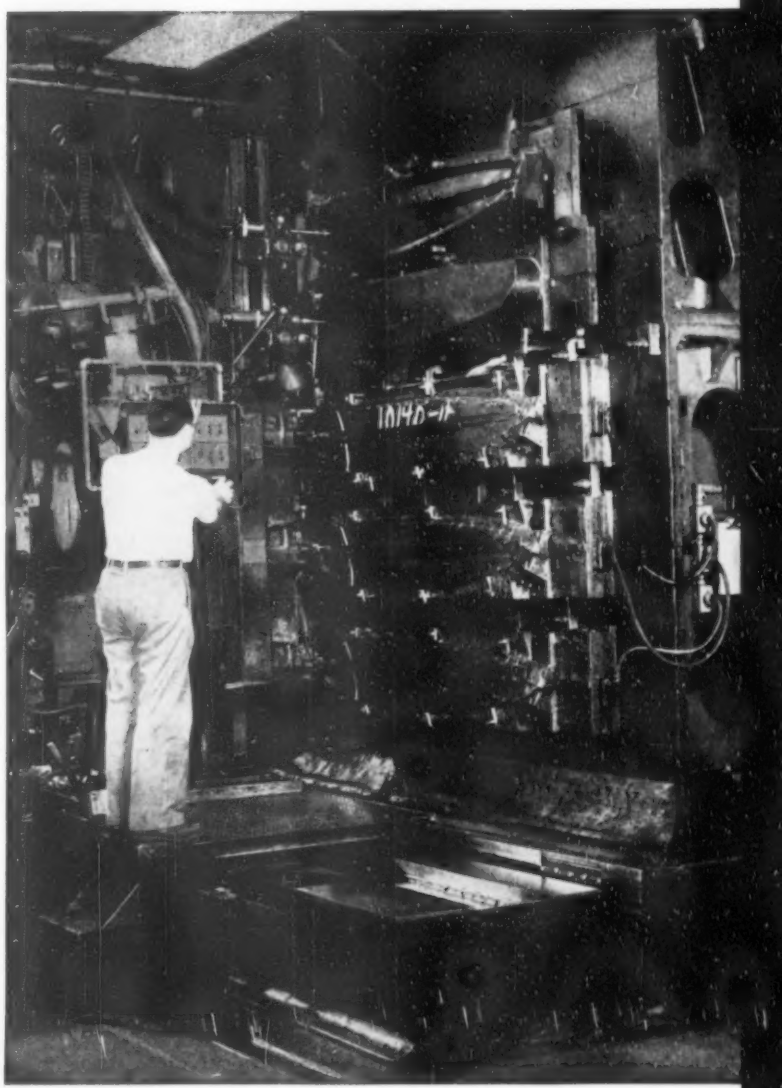
steel tests for propeller blades

AN important manufacturer of propellers for military aircraft has found that in stringent magnaflux tests, USS Carilloy steel performs completely satisfactorily.

The high stresses in propeller blades and hubs naturally require extremely high quality steels. Accordingly, the U.S. Army and U.S. Navy have set up rigid quality specifications requiring that every heavily stressed part must be magnafluxed several times during its production.

With USS Carilloy 4340 electric furnace aircraft quality steel, this important manufacturer is able to count on the performance required for this severe application. The consistent high quality of USS Carilloy aircraft steel has meant greater savings to this customer through minimum magnaflux rejections of costly fabricated parts.

USS Carilloy steels have established an enviable record for meeting the highest quality requirements. Therefore, when you need a standard AISI analysis or a special steel for an unusual application, it pays to call in a USS Service Metallurgist. He can help you solve any steel problem.



AFTER FORGING AND MILLING, 750-lb. thrust sections are hogged out on this Kellering Machine. Finished sections weigh about 155 lbs. USS Carilloy steel maintains a No. 1 quality position on these heavy-duty parts.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy USS Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

4-665

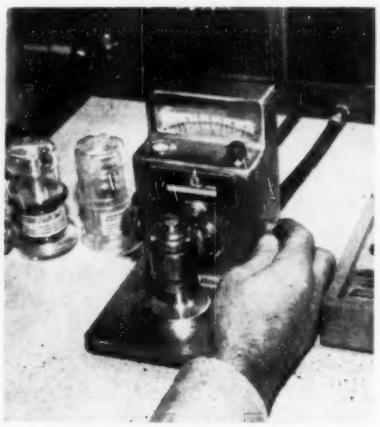
UNITED STATES STEEL

Dallas Firm Expands Overhaul Facilities

OVERHAULED ENGINES await transfer via four-switch monorail to adjacent test cells.

READY FOR ASSEMBLY, here are nearly 5,000 parts of a P&WA R985 in SAC shop.

BALANCING a gyro horizon rotor.



TORQUE TESTING a rotor bearing.

● Southwest Airmotive Co. spends $250,000 on engine-instrument shops, broadens distributor sales program.

Southwest Airmotive Co. is aiming to set new company records in its enlarged production and overhaul facilities, at Love Field, Dallas.

The firm, which sprawls through 225,000 sq. ft. in six buildings, plus 30 acres of concrete parking apron at Love Field, has recently completed a quarter-million-dollar expansion and improvement program.

▶ **What's New**—Here are some of the changes that the new building and equipment program have developed:

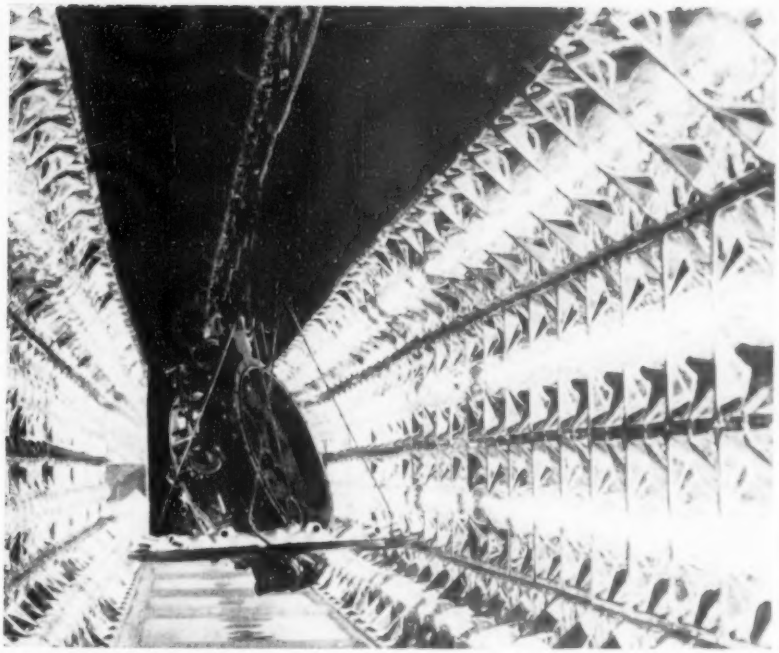
• **Enlarged lab.** SAC's instrument laboratory has undergone a major enlargement and has been completely re-equipped to handle all the latest type instruments, both electrical or vacuum. Manned by factory-trained specialists, the facility also engages in its specialty of custom-designing and manufacturing executive-aircraft instrument panels. Southwest worked closely with Eclipse-Pioneer division of Bendix Aviation Corp., for whom SAC is a distributor, in planning the new lab.

• **More production.** SAC has undertaken full-scale production in a 35,000-sq. ft. addition to its engine overhaul plant, which set a company record last year by turning out 2,105 completely rebuilt powerplants.

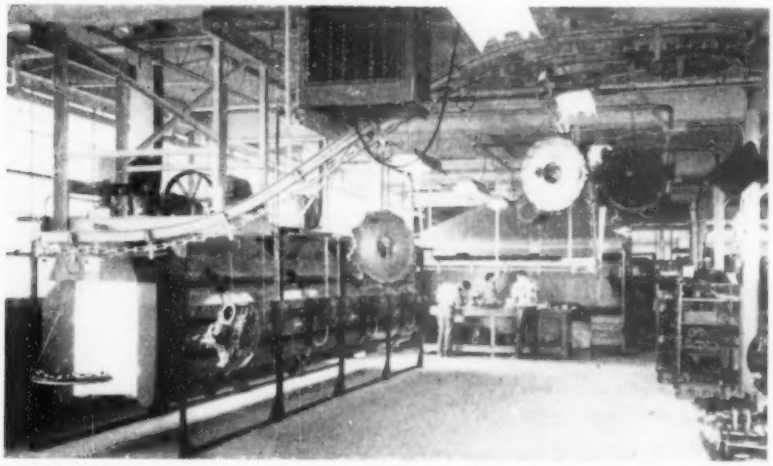
• **More test cells.** Through a lease arrangement with Braniff Airways, whose maintenance and overhaul headquarters are also located at Love Field, SAC has added a fifth engine test cell to its facilities. It will be used primarily on engines larger than the Pratt & Whitney Aircraft R985.

• **Broader sales program.** SAC has broadened its distributor sales program which serves several commercial airlines and fixed-base operators throughout the Southwest. Airline customers include Slick, Pan American, Pioneer, Central, American, TWA, Frontier, Continental, Braniff, Trans-Texas and Delta-C&S.

• **Other improvements include:** provision of an air-conditioned lounge for customers, with a car-rental office in case a customer needs an automobile during his stay in Dallas; enlarged flight operations room, with such facilities as a complete aeronautical chart, direct



INFRA-RED OVEN bakes painted engine parts moved past 256 bulbs by electrical conveyer.



PAINT DEPARTMENT, showing overhead conveyer feeding infra-red bake oven at left.

INSTRUMENT SHOP has quick-disconnect wiring at benches to allow facility expansion.

Do the Uncertainties of Tooling Costs Prevent You from Bringing Out That New Product?

A principal of Mechaneers Incorporated will sit down with your planners or at your Board meeting while your tooling appropriation is discussed. We will give you a firm price quotation for the process engineering, tool designing, tool building, tool tryout, and building of prototypes of your new product. Top management executives are invited to write for a copy of *"The Mechaneers Plan."*

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Over 85% of the torque wrenches used in industry are

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- Automatic Release
- All Capacities

in inch ounces . . . inch pounds . . . feet pounds (All Sizes from 0-6000 ft. lbs.)

Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. STURTEVANT CO.

Grumman

ENGINEERS
needed to
work on new
"Grumman Cat"

Grumman, nearing its 25th Anniversary, needs engineers to work on its new experimental light-weight Naval fighter, plus other jet fighters, anti-sub planes, and amphibians. Grumman has openings for experienced aircraft engineers, and recent engineering graduates.

LAYOUT DESIGNERS AND DRAFTSMEN
Airframe Structures
Equipment Installation
Detail Drafting

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Analysts
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STRUCTURES
Stress Analysis
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Applied Loads

Send resumés to Engineering Personnel Dept.
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GRUMMAN AIRCRAFT
ENGINEERING CORPORATION
BETHPAGE • LONG ISLAND • NEW YORK

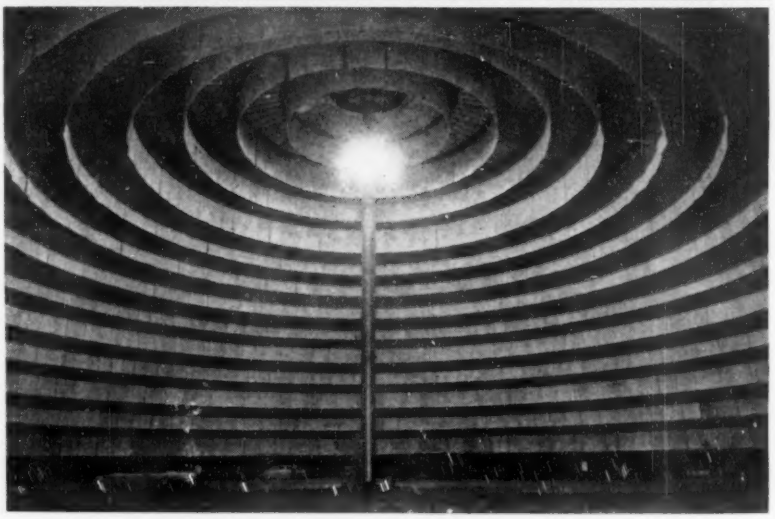
line to Carswell AFB flight control center, local telephones, work desks and an information bureau; and private lounges and offices for Magnolia Petroleum Co. and Delhi Oil Co., who jointly operate a total of 15 aircraft based at Southwest.

► **Engine Shop**—The new addition to the engine shop recently activated by SAC allows a straight-line production flow of engines from final assembly to test by means of an overhead monorail system. Included in the new equipment is a waterfall spray paint booth from which parts are conveyed through a 35-ft.-long infra-red baking oven.

The plant, which is an authorized representative for both Pratt & Whitney Aircraft and Wright Aeronautical Corp., includes among its customers the Air Force, a manufacturer using SAC-rebuilt engines in its new aircraft, several airlines, and private owners all over America.

Tooling to overhaul P&W R2800's is to be completed by summer.

► **Instrument Shop**—SAC's newly enlarged instrument shop has been equipped with the most up-to-date testing and overhaul machines and instruments available, the company says. These are used to maintain and overhaul gyro rotors, bearings, and the newest types of electrical instruments. The shop is completely air conditioned and includes such equipment as a gyro balance stand to calibrate vertical-axis gyros used in Fluxgate compass transmitters, PB-10 autopilots, and gyro horizons, a Fluxgate transmitter, and



Prefabricated Dome Hangar?

This huge steel and aluminum dome could be used to hangar about a dozen DC-3s or four times that number of smaller aircraft, according to R. G. LeTourneau, Inc., which designed and built it. There are no interior supports in this structure. At center, the 300-ft.-diameter building is 85 ft. high. The Semisphere, as LeTourneau calls it, covers over 70,000 sq. ft. of floor area and has a volume of close to 3.3 million cu. ft. The company says it will sell, completely erected, for a cost of less than $4 per square foot of floor space. The metal parts are shipped ready for erection, and a LeTourneau crew supervises construction by locally hired crew. Company's address is Longview, Tex.

ENGINE-DRIVEN G-E ENERGIZER, 28-volt, 500/1000-amp, mounted on 4-wheel trailer incorporates a completely self-contained power plant and weather-proof housing. Shown here starting an F-84 jet.

Designed specially for the Armed Forces . . .

G.E.'s Rugged, Engine-driven Energizers Give You Mobile, All-purpose Power Source

SELF-CONTAINED, HEAVY-DUTY G-E power plant, driven by industrial-type gasoline engine, fills requirements for 28 to 35-volt aircraft ground power source.

HIGHLY MOBILE, this unit is mounted on special 4-wheel pneumatic-tired trailer. Operating independently of power outlets it is used for starting and servicing all types of aircraft in hangar, shop, or on the field.

VERSATILE GROUND POWER supplied by G-E Aircraft Energizers meets every need for starting jet or reciprocating engines, ground checking and testing of instruments, factory production testing, and auxiliary power supply for repair areas.

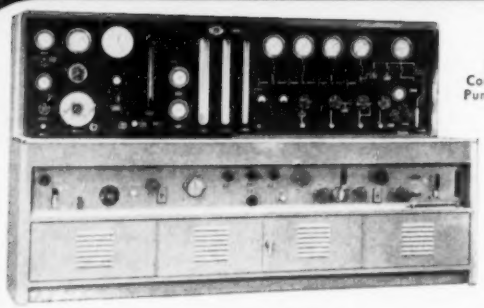
FOR COMPLETE INFORMATION, contact your nearest G-E Apparatus Sales Office or write for Bulletins GEA-5589, 5988, 5989, 5990. General Electric Co., Section 765-2, Schenectady 5, N. Y.

LET G.E. HELP SOLVE YOUR GROUND POWER SUPPLY PROBLEMS

GENERAL ELECTRIC

G-E Frequency Changer Energizer, 400-cycle (above)
G-E Motor-driven Energizer, 500/1000-amp, 28-volt (below)

Navy Type NC-5 Energizer manufactured by the Consolidated Diesel Electric Corp., Stamford, Conn., equipped with G-E AC and DC generators and control.

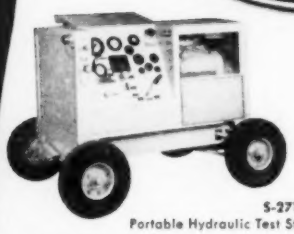


S-169
Hydraulic
Component and
Pump Test Stand

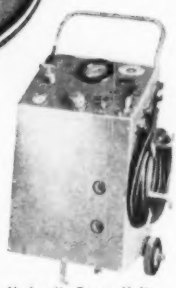
On conducted tours of your factory, is your test department a "must-see" or do you hurry visitors past it because test equipment being used is a hodge-podge of obsolete make-do units? Why not install *modern* equipment made by Sprague! Cost is moderate, efficiency is much improved. Standard and custom models. Write for bulletins.

The Better TEST MACHINES Bear this Trade Mark

SPRAGUE ENGINEERING & SALES CORPORATION



S-271-10
Portable Hydraulic Test Stand



S-404
Portable Hydraulic Power Unit

Sprague builds a complete line of hydraulic test machines ranging from the big test bench, Model S-169, illustrated at top, to various portable machines. Model S-271-10 is a rugged, heavy-duty machine built to take the roughest kind of airport service. Model S-404 is a small, inexpensive unit, designed for spot checks as well as system tests. Several companies buy the S-404 by the dozens for sub-assembly testing. Write for bulletins.

an Eclipse-Pioneer Var-O-Power, which provides a controllable electrical power source and metering equipment.

The Var-O-Power unit supplies three-phase, 115-v., 400-cycle power, three-phase, 26-v., 400-cycle power, and single-phase, 26-v., 400-cycle and variable d.c. voltages.

Also used is a master directional indicator tester. A Helmholtz coil is available for testing all types of E-P Fluxgate compass transmitters and standard compasses.

Adjacent rooms house machine tool equipment, parts inventory, sales and display counters and regional sales headquarters for Scintilla Division of Bendix Aviation Corp.

► **Summary**—SAC's other major activity at Love Field is that of fuel supplier. Last year it pumped some 3.5 million gal. of gasoline, which, the company says, is more than any comparable operator in the country handled.

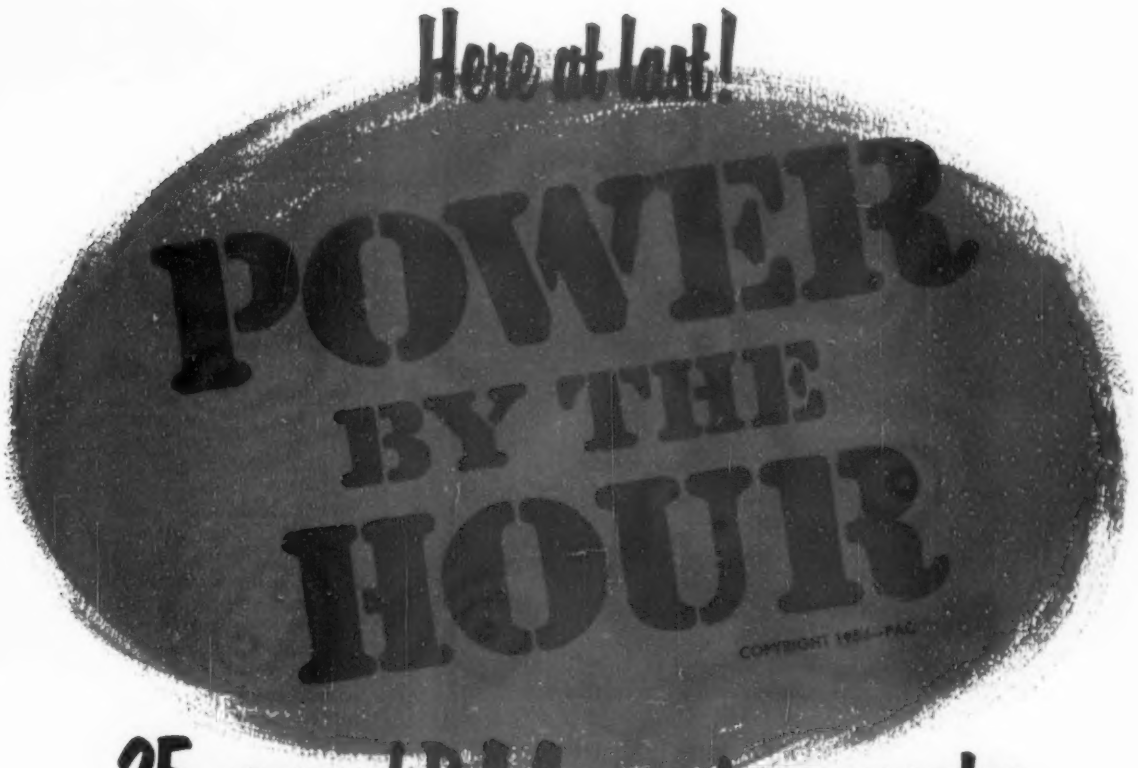
For the fiscal year ending May 31, SAC anticipates a gross sales volume of between five and six million dollars. Yearly payroll adds up to $1,250,000 and purchases in the local area are about $1 million. **—GLC**

OFF THE LINE

Hydro-Aire's Hytrol anti-skid device was recently tested by Pan American Grace Airways on a DC-6 at La Paz, Bolivia. The La Paz landing strip is 13,404 ft. above sea level, is 10,200 ft. long, has a clay-like surface covered with gravel and sand. Test results have not been announced.

Three new custom-interior jobs are underway at AiResearch Aviation Service Co., Los Angeles International Airport. Two of the aircraft are Convair 340s (owned by the Texas Co. and Union Carbide and Carbon Co.), which will also get Sperry A-12 autopilots and exterior paint jobs. The third plane is a Lockheed Lodestar (owned by Texas Eastern Transmission Co.). AiResearch recently completed installation of an A-12 autopilot, a new engine, and a one-piece windshield in a Sears, Roebuck executive DC-3.

Manning, Maxwell & Moore's Aircraft Products Division is putting up a new 50,000-sq. ft. plant in Danbury, Conn., where it is planned to employ 500 persons, more than twice the division's present employment. Expansion was made necessary by growth of company's line of jet engine temperature controls, pressure switches for rocket and jet engine applications, afterburner control systems, hydraulic valves and thermocouples.



25 years of P A C experience creates the first maintenance service that lets you predict costs!

POWER BY THE HOUR is a revolutionary approach to lower costs in engine maintenance. You simply pay for the power used and know to the penny what your costs will be at all times.

Your engines will be overhauled and fully warranteed in P A C's world-famous Pratt & Whitney Aircraft authorized engine shops. You'll have the advantages of constant modernization, constant surveillance, a complete parts history. You'll have a greater number of hours between engine changes...less out of service time...reduced maintenance costs!

POWER BY THE HOUR is available at both Burbank, Calif. and Linden, N.J. It will pay you to get the full story at once! Phone, wire or write!

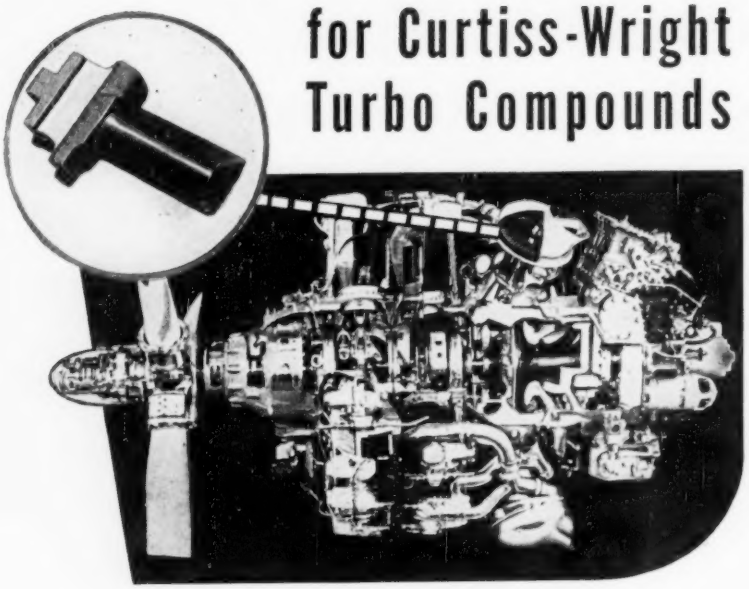
Pacific Airmotive Corporation

Other Divisions: Chino and Oakland, California
Seattle, Washington and Kansas City, Kansas

2940 N. Hollywood Way, Burbank, Calif.
Linden Airport, Linden, New Jersey

Buckets by MISCO

for Curtiss-Wright Turbo Compounds



This intricate bucket is an integral part of the power recovery units in the powerful Curtiss-Wright Turbo Compound Engine (shown above) which is now rated at 3700 h.p. for the U. S. Military Services and has been selected by 22 of the World's Leading Airlines for high-speed, long range transports.

Production of this complicated component clearly constitutes a notable MISCO achievement in practical engineering, metallurgical knowhow, and highly skilled techniques to meet the most exacting requirements.

For Castings of Greater Dependability, Better Performance and Longer Service Life, Specify

MISCO

PRODUCERS OF AIRCRAFT AND INDUSTRIAL INVESTMENT CASTINGS

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Whitehall 2-1515

NEW AVIATION PRODUCTS

Belgian Firm Offers Crankshaft Grinder

A machine designed for vertical grinding of crankshafts, said to make measuring and control operations considerably easier, is being offered by a Belgian firm, J. DeBuyser. U. S. sales for the equipment are being handled by the International Machinery Co.

Especially designed to grind crankshafts of DC-3, DC-4 and DC-6 aircraft, unit has horizontal bar from the slide which permits travel and rotation of grindwheel holder.

Control knob, equipped with a vernier measuring within .0004 in. toleration, allows adjustment of grinding wheel in relation with the workpiece. Company notes that entire attachment can be set back to control surfaces just ground.

Baseplate of frame has revolving plate in correct axis of machine.
motor, is affixed on sliding table and can be clamped by two bolts to insure correct positioning of workpiece. The workpiece is fixed on circular plate which rests on sliding table. Taper spindle permits steadying of table and

Vertical column, integral with frame, permits use of grinding stay and clock gauge for centering of clock pins and bearings.

Vertical movement is obtained from handwheel device which allows disengagement to obtain quick vertical travel of saddle. Oscillating movement of wheelholder is regulated by two dog-stops said to permit grinding of even smallest bearings.

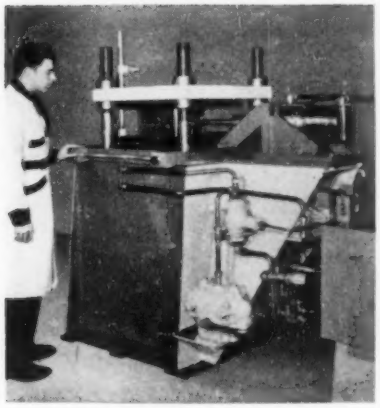
Spindle is made of high-tensile steel. Grinding feed is said to be assured by means of a micrometic screw. Grinding wheels are fixed by screw, pins and tapers, can be easily centered or dismounted.

International Machinery Co., 3135 E. Jefferson, Detroit, Mich.

175-Ton Inverted Press For Extrusion and Bending

A 175-ton inverted hydraulic press for bending and extrusion processes on ferrous and non-ferrous parts, as well as for upsetting, drawing and coining operations that would require special auxiliary equipment on standard presses, is available from Walter P. Hill, Inc., Detroit.

The hydraulic control cylinder is in the base of the machine, reducing overall height, avoiding shut-height limitations, lowering center of gravity and providing areas at the top and sides for



mounting auxiliary hydraulic cylinders.

Power is supplied by a separate Hill No. 4 hydraulic power pack with a 20-hp. motor and a 30-gpm., 1,000-psi. pump.

Walter P. Hill, Inc., 22183 Telegraph Rd., Detroit 19, Mich.

Engine Pre-Oiler Prevents Dry Starts

Dry starts, resulting in possible loss of aircraft engine, are reportedly prevented with a newly developed pre-oiler which permits complete cleaning and lubrication prior to starting.

Known as the Durham pre-oiler, it is said to operate without "spot-cracking" or carbonization of the lubricating oil. Added feature is recirculation of oil when pre-oiler is not in use, insuring maintenance of sufficient oil temperatures.

Durham Aircraft Service, Inc., 56-15 Northern Blvd., Woodside 77, N. Y.

ALSO ON THE MARKET

De-icing compound, developed for removing ice and frost from military aircraft, also has applications in getting rid of these substances from coils of cooling machinery and other places where they form. It emits no toxic or obnoxious fumes and is harmless to the skin, says the maker. Trade name is Frost Buster.—Octagon Process, Inc., 15 Bank St., Staten Island 1, N. Y.

All-metal cup-type mount, designed to protect sensitive equipment from vibration and shock in mobile, shipboard and industrial applications, employs resilient cushioning material of metal wire known as Met-L-Flex. Feature is close limiting action created by top and bottom Met-L-Flex buffer pads within housing, providing gradual increase in stiffness, along with high damping for positive, negative and radial motion and shock.—Robinson Aviation, Inc., Industrial Division, Teterboro, N. J.

GOT A JOB FOR THE WORLD'S MOST SENSITIVE GYRO?

Cut-away view of Gyro GG1

THAT cylinder you see above should soon be causing a lot of excitement, now that we're permitted to take the security wraps off.

Its name is the Honeywell Integrating Gyro, called HIG for short. To date we've made over 10,000 of these amazing gyros.

Their moving parts rotate in a fluid on a gimbal that is jewel-mounted. Because of this nearly frictionless mounting, the HIG can measure things as minute as a speed 1/100th that of the hour hand on a watch.

And it's so rugged it can do such precision jobs even after being used as a hammer to drive a nail.

Up to now, major uses of the HIG have been in missile guidance systems and in radar stabilization and fine control systems. You may have a very different application of the HIG in mind. If so, we'd like to hear from you. The address is Honeywell Aero Division, Dept. 658 (AW), Minneapolis 13, Minn. We'll be glad to send full details—on the HIG, and on our full gyro line as well.

Besides the HIG, Honeywell, a leader in gyro production, manufactures Vertical Gyros, Cageable Vertical Gyros and damped and undamped Rate Gyros—all available on a mass production basis to industry.

Specifications of Honeywell Integrating Gyro GG1

Pickoff Resolution: Better than 0.00001 radians of arc.

Pickoff Sensitivity: 34 mv/milliradian with 100 ma. excitation at 400 cps.

Angular Momentum: 100,000 gm cm^2/sec.

Rotor Speed: 12,000 rpm.

Gimbal Travel: $\pm$ 6.0°

Transfer Ratio $\frac{\text{Output Angle}}{\text{Input Angle}} = 1$

Characteristic Time Constant: 0.0028 seconds.

Spin Motor Power Requirement: 10 volts, 400 cps, three phase, 0.65 amperes per phase.

Weight: less than 3 lbs.

Dimensions: length 6"; diameter 2.75".

MINNEAPOLIS **Honeywell**

Aeronautical Controls

They're pioneering jet-to-jet aerial refueling

Aerial refueling has been described as one of the most significant advances in recent aviation. It progressed another important step forward when a specially fitted Boeing B-47 bomber made the world's first jet-to-jet transfer of fuel aloft—refueling first a jet fighter and later a companion B-47 Stratojet.

The modified Stratojet that acts as tanker in this continuing test program is a 10-mile-a-minute medium bomber fitted with fuel tanks, high-pressure pumps and lines. Designated the KB-47, it is demonstrating the practicability of aerial refueling at the extreme altitudes and high speeds at which modern jet aircraft normally operate.

While Boeing's piston-powered KC-97, the standard Air Force tanker, is admirably suited to the needs of today and the immediate future, tests with the experimental KB-47 prove the feasibility of transferring fuel at jet speeds. These tests also pave the way for the development of a jet-powered tanker large enough to carry ample cargos of fuel, and fast enough to deliver it aloft to jet fighters and jet bombers at the speeds and altitudes at which they function most efficiently.

Such a jet-powered tanker would be capable of accompanying jet aircraft on their missions, and refueling them by one of several proved methods without the necessity of cutting back to lower speeds and dropping down to lower altitudes.

Recognizing the coming need for an advanced jet transport, Boeing is constructing a prototype aircraft designed to be adaptable for either military or commercial use. This undertaking, in which Boeing is investing its own funds, grows naturally out of the company's leadership in the field of large, multi-jet aircraft, and out of its unparalleled background of experience designing and building aerial tankers and aerial refueling equipment.

The integrity of Boeing design, research and production is assurance that the coming Boeing jet tanker-transport—like the earlier Flying Fortresses and Superfortresses, and the new B-47 and B-52 jet bombers—will be an aircraft on which America can depend.

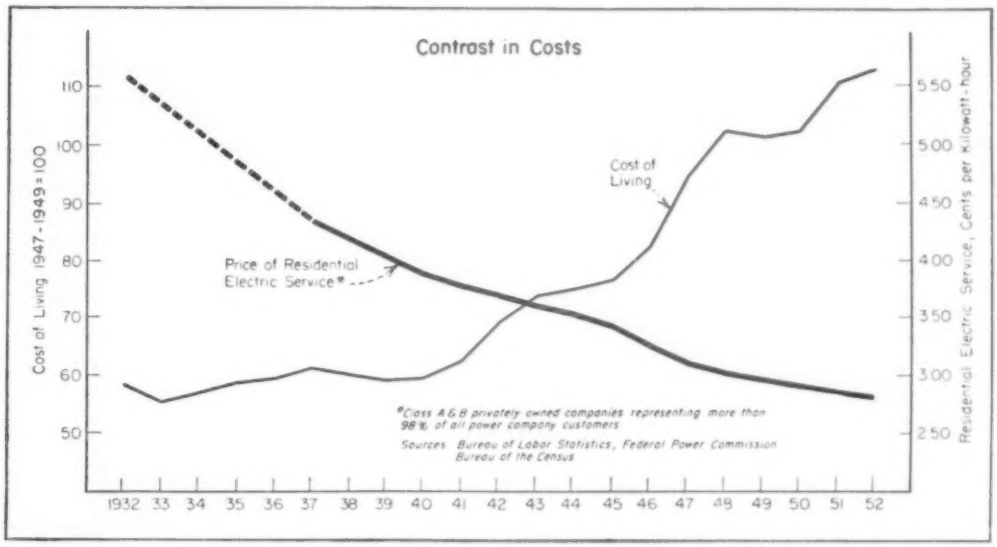
This crest is symbolic of the Strategic Air Command's strength and global achievements. It is found on such Boeing planes as the B-29, B-50, KC-97, B-47 and shortly will take its place on the B-52.

BOEING

A 20-YEAR RECORD . . .

The Electric Power Companies' Case for Public Confidence

An economic study of the record of the investor-owned electric power companies of the United States over the past twenty years underwrites their claim to public confidence today. A key factor of this record is set forth by the chart in the middle of this page. This shows that while the cost of living as a whole has almost doubled, the average price of electric energy for residential use in the United States has been cut in half.



The average prices of industrial and commercial power also are much lower than they were twenty years ago.

Such a study confirms the record on other key accomplishments of the electric power companies during the past two decades.

They have not failed, either in peace or war, to meet the nation's rapidly expanding electric power requirements. In paying tribute to the performance of these companies during World War II, J. A. Krug, Director of the Office of War Utilities, said, "Power has never been too little or too late." The same can be said for the entire period of the past twenty years.

To be ready with enough power – on time – the electric power companies have expanded their production fourfold since 1933. This has required an investment of over $17 billion in new facilities. To raise the funds for this investment they have enlisted the participation of about 3 million direct stockholders. Through life insurance companies, banks and similar institutions, about 90 million Americans – more than half of the nation's total population – have become investors in electric power companies. By thus relying on private investment for their expansion, the power companies have provided their

plant and operating equipment without burden on the taxpayer.

In addition, the investor-owned companies have paid about $12 billion in taxes to various governments – national, state and local – over the past twenty years. Unlike government-owned and -operated systems, they have received no public subsidies. When taxes and subsidies are taken into account, the rates for electricity charged by the investor-owned companies have been as low as, or lower than, those charged by government-owned and -operated systems.

Many Americans do not appreciate the job that the power companies have done over the past two decades. That is due, in part, to the public memory of financial abuses by some utility holding companies during the 1920's. This memory obscures a clear and unprejudiced view of the progress since those days. And some of the all-out advocates of reliance on government rather than on regulated private enterprise for the development of our power resources do their best to keep this memory of the past alive in the present.

An Impressive Case

Some special cases of electric power development may involve problems for which the investor-owned companies are unable to provide full solutions. This may be true, for example, of some large multiple-purpose projects that combine electric power generation with related developments such as the improvement of navigation, flood control and the irrigation of arid lands. Some of the economic and administrative problems imposed by such projects are not well adapted to effective handling by private enterprise. Flood control and the improvement of navigation, for example, usually involve the provision of much costly service over and above the cost of producing power.

It is true, however, that in some cases development of the electric power side of multiple-purpose projects by private enterprise may well be more feasible than would appear from statements by some government power advocates. And the record indicates that even in those projects on which both the power generation and the other services are handled by public authority, it may well be desirable to have the investor-owned companies assume the transmission and distribution functions.

Our study of the record of the investor-owned and -operated companies over the past twenty years has led us, of course, behind the statistics that bear on the wisdom of giving them a priority in the development of our power resources. It reveals that these enterprises are manned by people who, through lifetime experience, are peculiarly conversant with the needs of the communities they serve. They have given the consumer notably good service while conforming to standards set and enforced by public regulatory commissions. They have won the confidence of the investing public. By their nature and their experience they are competent to handle any power program that can be demonstrated to be economically sound.

The Paramount Public Interest

By their economic performance during the last twenty years, the electric power companies have earned the confidence of the public. By relying on these companies to meet its electric power requirements the public will fully protect its economic interest in ample and efficient service at fair prices.

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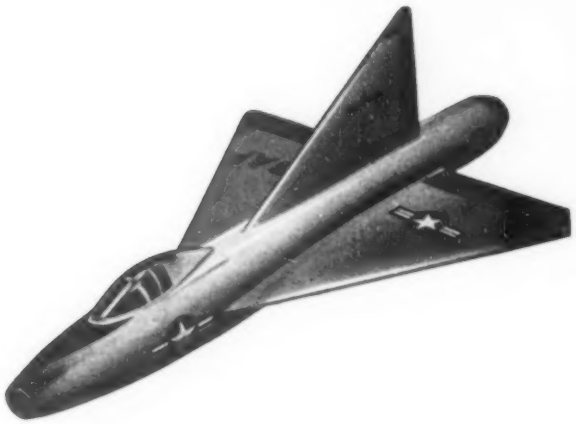

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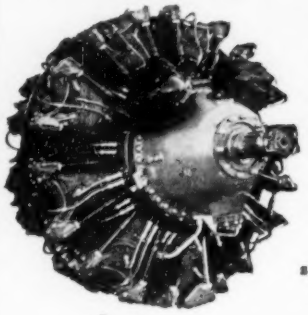

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Murray Asks $33 Million for Airport Aid

- **Transport chief requests largest appropriation since 1950, plans spending for defense and safety facilities.**
- **New policy would increase CAA's discretionary fund, make more money available for state and local projects.**

By Richard Balentine

Commerce Department will ask Congress for a $33-million supplemental appropriation for its new, tightened federal airport aid program.

Aid to state and local governments is restricted under the program to construction that is in the strict interest of the national defense or airways safety, and bans the use of funds for terminal building construction.

Undersecretary of Commerce for Transportation Robert Murray outlined his airport policy in an AVIATION WEEK interview. He says the department intends to go ahead with a "more realistic" aid program than that carried out by previous administrations. It now is in the hands of the Budget Bureau.

▶ **Largest Amount**—Congress appropriated $45 million for airport aid the first year the Airport Act was in operation. This was reduced in successive years until $14.3 million was requested in 1953. The proposed request for $33 million is the largest amount asked in four years.

Included is a request for legislation increasing the program's discretionary fund from 25 to 50%. Formerly 75% of the program's funds have been distributed to the states according to their land area and population factors. The remaining 25%, a discretionary fund, was expended where Civil Aeronautics Administration deemed advisable in furthering specific projects.

"By increasing the discretionary fund," says Murray, "we will have more available money to concentrate where it will do the most good. Before, we have never been able to put enough funds into one particular project to bring it along far enough."

A new review is to be made of the criteria deciding the eligibility of future airport projects. Murray calls the requirements established in 1952 in CAA's interim planning standards "a step in the right direction." These standards set up the specific rules by which an airport construction project was considered eligible for federal aid.

They will be given intensive study by CAA in the next few months in establishing a new set of regulations.

▶ **Panel Study**—Murray's airport program was evolved after a nine-month study made by an airport panel of the Transportation Council (AVIATION WEEK Mar. 1, p. 16). The special study panel was appointed by the Undersecretary last year.

"We are taking advantage of past criticisms of the air program," Murray says, "in an attempt to bring about a more realistic and economical program in the national interest."

Since 1946, when the Federal Airport Act became effective, federal funds have been spent on airport parking lots and other appended facilities in an attempt to build up entire airport areas. The program was designed to promote lightplane activity in an expected postwar lull. But the expected volume of lightplane traffic never materialized.

▶ **Safety Factor**—Under the new policy, in which the emphasis is changed, funds will be restricted to runways, lighting and other necessary facilities that would be required should a national emergency arise and the fields needed for military use.

Safety is to be a big factor in allotting funds. Cases where localities need extra funds in order to provide CAA-required facilities, such as navigational aids, will be given high priority.

▶ **Terminal Aid Ends**—"But the government is going out of the terminal building business," the Undersecretary says.

The airport panel reported that "the federal government should participate financially with state and local governments in the construction and development of civil airports to the extent that these facilities serve the national interest."

Terminal buildings cannot be considered as serving the national interest, says Murray.

The panel also found that "because terminal buildings are revenue-producing facilities, they should not receive federal grants-in-aid. However, as a corollary," the panel found, "all federal agencies should pay for all their space requirements including construction and maintenance, on a self-liquidating basis."

▶ **$30-Million Cut**—The Eisenhower Administration last spring planned to cut $30 million for airport aid from CAA's 1954 budget until a study was made of the program, stirring considerable congressional criticism on Capitol Hill (AVIATION WEEK May 4, p. 16).

Democrats and Republicans alike criticized the plan on the ground that it might be some years before a federal-state relations policy could be worked out successfully. In the meantime, they felt, airport development should go on.

CAA Administrator Fred B. Lee was caught in the middle of the fight after he supported the $30 million for airport development because "heavier, more diversified aircraft require that funds be increased to avoid having deficiencies in services become deterrents to the use and development of U.S. airpower."

▶ **Lee Approval Held Up**—For a time, criticism of Lee's stand in light of the Administration proposal delayed approval of his nomination as CAA Administrator by the Senate Interstate and Foreign Commerce Committee.

Thus far, $214 million of the $520 million authorized by Congress for federal airport aid under the 1946 act has been appropriated. If the $306-million authorization is to be spent before the act expires in 1958, annual appropriations will have to average more than $70 million.

S&WA Fights Review Of Atlantic Cargo Case

Seaboard & Western Airlines has called upon Civil Aeronautics Board to deny a motion by Trans World Airlines to reopen records of the trans-Atlantic cargo case to show further evidence why S&WA should not be certified for the all-freight operation.

In making its motion, TWA had claimed that a review of the records would show Seaboard was flying "regularly and frequently" in violation of its authority.

Commenting on TWA's action, Arthur V. Norden, S&WA's executive vice president, says: "TWA's absurd accusation is like a lawyer accusing a licensed medical doctor of practicing without a license. In a frenzied maneuver . . . to stall certification of Seaboard, TWA has made the reckless and malicious accusations that we are flying without an authority which CAB gave us almost two years ago."

In a document to CAB, the carrier states, "Not only does Seaboard hold operating authority as a large irregular

carrier but, by special exemption granted at the suggestion of the President, S&W is authorized to operate not exceeding 12 additional flights per month carrying traffic on behalf of agencies of the U.S. government in overseas and foreign air transportation of cargo without limitation as to regularity of service."

As yet, CAB has not taken any action.

PAA Sets Up First Global Coach Service

First round-the-world through air-coach service will begin Apr. 1 when Pan American World Airways inaugurates new, low-cost tourist flights on its routes from San Francisco, Los Angeles, Portland and Seattle to Asia and the South Pacific.

Up to now, this was the only segment of PAA's globe-circling route that did not have coach service. Upon inauguration of the new service, a passenger from any of these West Coast cities will be able to fly around the world, by the most direct route and with stopover privileges, for $1,347.85. First-class fare for the same run is $1,794.55.

▶**Combination Class**—Pan American plans to combine both tourist and first-class aboard the same aircraft on the Pacific routes. A number of the airline's Boeing Stratocruisers have been modified specially for the job.

The combination-class Stratocruisers will be utilized on routes to Sydney, via the Fijis, and to Manila, via Guam. PAA also is converting Douglas DC-4s for combination service between the Fijis and Auckland and from Manila to Hong Kong, Saigon and Singapore.

▶**Separate Flights**—On its route from the West Coast to Tokyo via Honolulu, PAA will carry first-class and aircoach passengers on separate Stratocruisers. Westbound from Tokyo to Hong Kong, Bangkok, India, the Near East, Europe and New York, combined service will be provided on DC-6Bs. All Stratocruisers on the carrier's Atlantic routes are first-class only.

From New York to the West Coast, round-the-world passengers travel by domestic airline.

▶**Modified Stratocruisers**—In modifying the Stratocruisers, PAA's Pacific-Alaska Division has allocated the forward portion of the aircraft for tourist class. Seating arrangement will be similar to that used on West Coast-Honolulu tourist flights, with the exception of new-type reclining seats that are being installed.

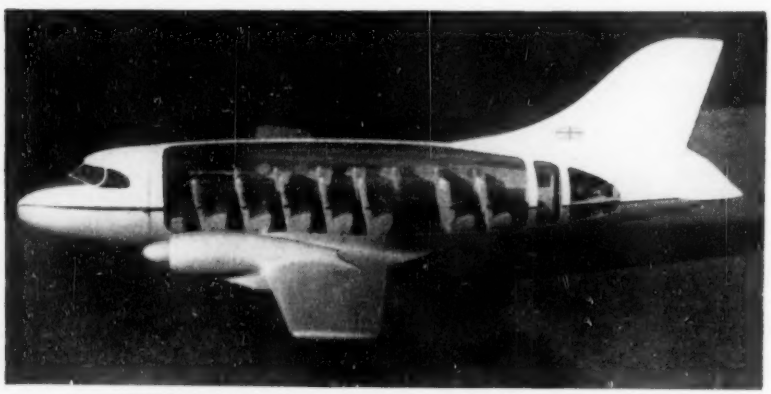
Aft portion of the aircraft is reserved for first-class passengers, with a partition dividing the two sections.

▶**Free Tourist Meals**—Tourist passengers will receive complimentary meals and are permitted free baggage carriage up to 44 lb.

First-class passengers on these flights have separate dressing room facilities, a baggage allowance of 66 lb., exclusive use of the lower-deck lounge, meals with champagne and dinner wines plus Sleepcrette seats.

Berths still are available at an additional charge.

Normally, the seating arrangement aboard the Stratocruisers will provide for 35 tourist and 24 first-class passengers. But PAA says this ratio can be altered when traffic conditions warrant by removal of the partition between the two sections.



British Design 'DC-3 Replacement'

Cutaway model of Aviation Traders (Engineering), Ltd., Accountant transport, designed by the firm as a DC-3 replacement. The Accountant is designed to seat 22-23 passengers (shown here is rearward-facing seat layout). Powerplants will be two Rolls-Royce Dart turboprops. Construction features novel "petal" technique of covering the plane with metal without using stretch presses and permitting introduction of double curvatures during assembly (Aviation Week Oct. 26, 1953, p. 56). An Accountant prototype is under construction. Gross weight will be 21,000 lb.

Air America Loses Name in New Ruling

American Airlines has won another victory for its name with Civil Aeronautics Board's order that Air America, Inc., and Air America Agency Corp. stop using the word "America."

Air America's attorney said last week the airline would probably file an appeal with CAB within 10 days.

The Board last November ordered North American Airlines to "cease and desist" from using "American."

The nonsked has appealed the ruling.

In the Air America case, CAB Examiner Edward T. Stodola ruled that:

- Names "American" and "American Airlines" have acquired a secondary meaning in air transport identifying American Airlines to the public and had acquired such meaning prior to the date of incorporation of each of the respondents.
- Use of the name Air America implies an affiliate or subsidiary of American Airlines and has been used with intent to create that belief.
- Use of name by both carriers causes "confusion among and injury to a substantial number of the public."

Stodola said Air America's use of the name was "unfair or deceptive practice" and "an unfair method of competition in air transportation."

He called Air America receptive because it promised not to employ the "AA" shield in its newspaper advertising. Yet in 1953, he charged, it used that symbol on the aircraft it operated.

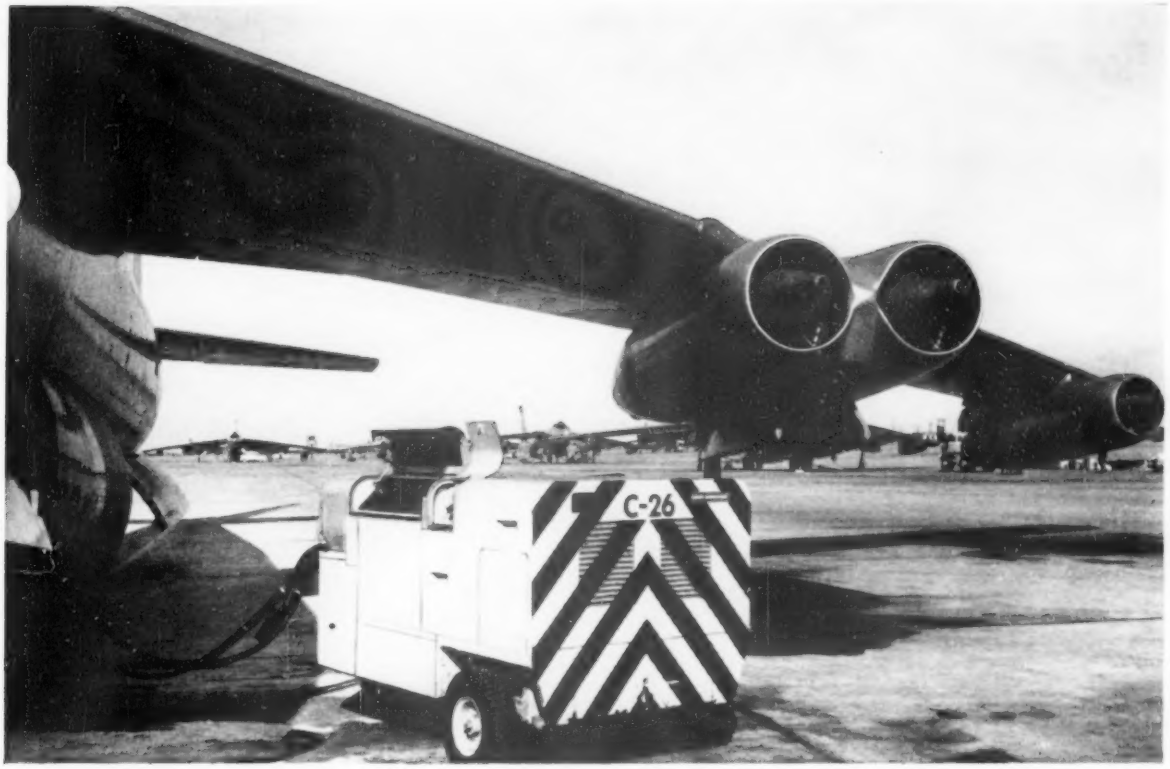
"Mere addition of the prefix 'Air' does not sufficiently distinguish the Air America name so as to prevent the likelihood of confusion with American," he said. "The prefix does little more than reverse the order of the words 'American Airlines'."

The examiner's initial decision was brought about by American Airlines' complaint last April that Air America, by use of the similar name, created the impression that the nonsked rendered the services of a regularly scheduled airline.

Court Ruling Backs Higher Takeoff Fees

Trans World Airlines, hit by an adverse decision handed down by San Francisco's federal district court, will be required to pay takeoff fees based on aircraft weight when operating out of the city's municipal airport.

The court held that the Public Utilities Commission can fix fees for common use facilities, regardless of previous lease agreements. Up to now, TWA has been operating on fixed fees established in a 20-year lease granted in



ADRENALIN for JETS

Spinning massive jet engines from a dead stop to thousands of revolutions per minute was a problem created by production of America's newest jet bomber and fighter aircraft.

How to avoid slow and sluggish jet engine starting? How to prevent excessive strain and drain on the aircraft's own electrical energy system? How to prevent dissipating uselessly high voltage needed for accurate operation of delicate electronic instruments?

The Beech-designed *C-26 Generator* today supplies just such important "adrenalin for jets" — as a self-propelled generating system, it has the super power to whip thousands of jet-engine horsepower into throbbing action within seconds!

Because of the Beechcraft produced C-26 Generators, jet aircraft now can become airborne with greater speed and efficiency. In addition to producing three important military trainer-transports, Beech Aircraft is privileged to produce the C-26 Generators for the United States military aircraft services.

Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

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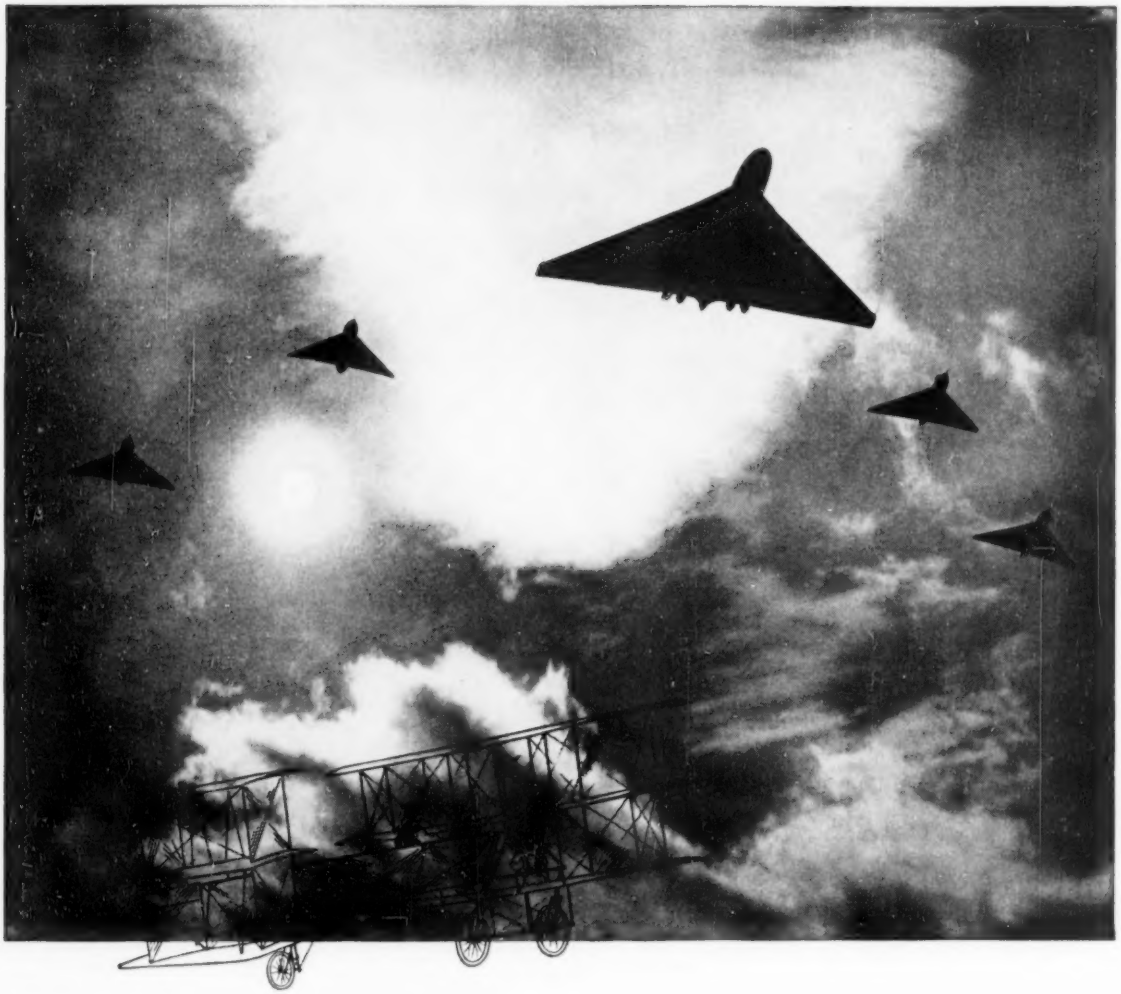
"BOMBS AWAY" — The story of an R.A.F. Bomber

No. 1 in a series on the Avro Vulcan



Edwardian Aeronauts *and the start of it all...*

In 1907, four years after the Wright Brothers wrote a completely new page of world history by flying the first heavier than air machine, a young engineer won first prize in the London Daily Mail Model Aeroplane competition. By July two years later he had designed, built and flown the first ever all British Aeroplane. His name was A. V. Roe, his plane the Roe 1 Triplane. Such were the beginnings of Avro—with an inspiring "first" in the aircraft world. Today the great firm of A. V. Roe & Co. Limited, has another "first", no less inspiring, no less courageous in its pioneering audacity: the world's first 4-jet *delta* bomber: the mighty Avro Vulcan. The delta is the best design in existence completely to fulfil the vital new requirements for near-sonic flight at high altitudes and long range . . . a wing that is highly swept back, very thin, with a large surface area yet a small span. With its delta planform the Vulcan is the world's most formidable bomber. It is now in super-priority production for the Royal Air Force.

A.V. Roe & CO. LIMITED / *Manchester* / *England*

AVRO

MEMBER OF THE HAWKER SIDDELEY GROUP / PIONEER...AND WORLD LEADER IN AVIATION

1942. When PUC attempted to charge higher rates, the airline initiated the suit.

▶**$8-Million Increase**—PUC officials estimate the decision will result in an $8-million increase in the airport's revenues. Feeling is that the case could set a precedent for municipally owned airports throughout the country.

"This is very definitely a major step in bringing the airport to the place where it can pay for itself," says San Francisco City Attorney Dion Holm.

The court has ordered TWA to pay the increased rates retroactive to Dec. 31, 1950. In addition to TWA, the ruling also is applicable to Pan American World Airways, United Air Lines and other companies with preferential lease agreements.

▶**Heavier Transports**—The court decreed that PUC's charter powers supersede such contracts; that the commission is a rate-fixing body with jurisdiction over the airport, a public utility; and that the city may provide utility service outside the city and county.

PUC's argument for higher rates was based on the increased size of aircraft since the original contracts were let—from 28,000 lb. to 100,000 lb. or more—necessitating longer and thicker runways and taxi areas plus higher overall maintenance costs.

Airlines are expected to appeal the decision.

Lee Asks Reduction Of Aircraft Noise

A call for all major groups of aircraft owners, operators and pilots to intensify efforts toward reduction of airplane noise has been issued by Civil Aeronautics Administrator Fred B. Lee.

In a widely distributed letter, Lee says: "Soon spring weather and open windows will focus attention again on the matter of airplane noise. It seems timely, therefore, that all of us in aviation who have been working together for noise reduction intensify our efforts."

Lee asked pilots to:

- **Operate aircraft** with utmost consideration of persons on the ground.
- **Keep low-altitude flights** over congested areas to the unavoidable minimum required for safe landings and takeoffs in accordance with wind conditions.
- **Carefully observe the regulation** requiring an altitude of at least 1,000 ft. above obstacles in congested areas, except when necessary for takeoffs or landings.
- **Select flight paths** over the least congested areas whenever wind conditions permit.
- **Continue reduction** in noise nuisance, achieved by carefully worked out procedures for more raipd climb on takeoff.

"I am sure that the American people, knowing we are doing all in our power for their safety and comfort, will accept the unavoidable minimum of noise that remains," Lee says.

Sharp Fare Cut

Trans World Airlines has asked Civil Aeronautics Board for permission to cut sleeper berth fares on New York-West Coast Super Constellation flights from $95 to $25.

E. O. Cocke, TWA vice president-sales, says the proposed charge is less than the cost of a Pullman lower berth and would allow passengers in double berths to sleep on cross-country flights for $12.50 per person.

Board Charges NAL Hid Cuban Interests

National Airlines was preparing an answer last week to what it termed "ridiculous" charges brought by Civil Aeronautics Board's Office of Compliance that:

- **G. T. Baker,** NAL president, has owned all the outstanding shares of stock of Acrovias Internationales, S. A., of Cuba since Oct. 3, 1946, without disclosing the fact to the Board.
- **National** failed to treat the operations of Acrovias as direct station operations of National in Havana and failed to keep the entries on its books with respect to such operations.
- **NAL refused** to give the Board's special agents and auditors access to Acrovias' books and records.

CAB's compliance office asks that the Board order National to cease and desist from such violations.

Acrovias has maintained and operated National's sales offices in Havana since Dec. 15, 1946. It sells transportation on National, performing all government clearance services and ground services.

UAL Reports Record Revenues, High Costs

Narrowing profit margins "in which rising costs outpaced increased revenues" resulted in United Air Lines earning $1,611,438 less in 1953 than it did the previous year, UAL president W. A. Patterson reports.

Net income in 1953 was $9,072,382, second highest in the company's 28-year history and exceeded only by the $10,683,820 net for 1952.

Although more passengers and cargo were carried by the airline in 1953 than in any other year, earnings declined because of:

- Introduction of Convair 340s accompanied by relatively low load factors, particularly where the 44-seat transport replaced 21-seat DC-3s.
- Low utilization in the initial period of Convair operation.
- Stationary level of rates and fares despite cost increases.
- Undetermined amount of diversion of first-class traffic to lower-fare coach services.
- Increased depreciation charges.
- Decline in the company's overall load factor due to expanded capacity and intensified competition from other carriers.

Operating revenues totaled $172,967,280, a gain of 9% over the $159,007,936 of 1952. Expenses were $153,941,064, up 14% over the previous year's $134,680,330.

The increase in expenses included increase of:

- $5 million in wage rates.
- $1.1 million in gasoline costs.
- $4.2 million in depreciation.

FTL, Slick Pilots Set Agreement Deadline

Pilots of Slick Airways and the Flying Tiger Line have set Apr. 15 as the deadline for agreement on integration of seniority lists in the dispute currently delaying merger of the two cargo airlines (Aviation Week Jan. 18, p. 80).

Civil Aeronautics Board approved the merger Jan. 7 with the stipulation that the seniority problem must be resolved by both groups of pilots. Air Line Pilots Assn., representing FTL pilots, is mediating the matter with Slick Independent Airways Pilots Assn.

▶**Petition Denied**—CAB has denied Slick Pilots' petition of Jan. 21 asking the Board to undertake integration of the seniority lists.

In considering Slick's petition, the Board found that "while it is true that our decision does not specify the procedure to be followed if the parties cannot agree upon an arbitrator or the method or procedure for the arbitration, we do not consider this to be any defect in the conditions we have adopted."

Pilots are attempting to work out a formula. Mechanics of the two merging companies have a similar problem. However, it is not expected their difficulties will take as long to solve.

▶**Merger Terms**—Under the terms of the merger agreement, Flying Tigers will emerge the surviving corporation with FTL president Robert W. Prescott as chief executive of the new combined line. Officials expect the merger to be totally effective Apr. 15.

CAB ORDERS

(Feb. 25-Mar. 9)

DISMISSED:

American Airlines request for certification of Kansas City, Mo., on its routes as consolidated into the Denver service case hearing.

Application of Albert J. Leeward and Leeward Aeronautical Service in the matter of suspension of the letter of registration as a large irregular airline.

Capitol Airways' application for an exemption from the Civil Aeronautics Act.

Delta-C&S Air Lines' and Eastern Air Lines' complaints requesting suspension and investigation of a rule proposed by Resort Airlines that would increase passenger stopover time at Miami, Fla., on tours to the Caribbean.

Proceeding involving Capital Airlines and Northwest Orient Airlines proposals to permit excursion fare travel on Saturdays.

Complaint of Flying Tiger Line and Slick Airways against proposed reductions in rates on aircraft parts.

APPROVED:

Amendment to the air express agreement by and between certain certificated air carriers and the Railway Express Agency relating to extending the agreement to May 31.

Intercompany arrangements between Trans World Airlines and Japan Air Lines and various other carriers.

Intercompany arrangements between Delta-C&S Air Lines and American Airlines and various other carriers.

GRANTED:

Postmaster General, Provincetown (Mass.) chamber of commerce and the Provincetown Civic Assn. leave to intervene in the investigation of Northeast Airlines service to Provincetown.

Northeast Airlines request to use North Central State Airport in serving Providence, R. I.

Transocean Air Lines permission to operate one flight between Munich, Germany, and New York, carrying passengers and baggage under a contract with the Intergovernmental Committee for European Migration.

Northwest Orient Airlines, Pan American World Airways, Trans World Airlines, United Air Lines and the Postmaster General leave to intervene in the Seaboard & Western Airlines and Transocean Air Lines mail rate case.

Trans World Airlines request for a hearing on its proposal to provide service between Frankfurt, Germany and Zurich, Switzerland.

ORDERED:

Investigation into the matter of reduced local and joint fares for States-Alaska service proposed by Pacific Airlines, Alaska Coastal Airlines, United Air Lines, Western Air Lines and West Coast Airlines.

Trans-Texas Airways to show cause why the Board should not fix its temporary mail pay.

Investigation into the matter of reduced passenger-mile rates filed by S.S.W., Inc.

Peruvian International Airways to show cause why the Board should not cancel or revoke its foreign air carrier permit.

Consolidation of the joint application of the city of Reno, Nev., and its chamber of commerce into the Denver service case.

Trans-Pacific Airlines mail rates fixed.

Hawaiian Airline mail rates fixed.

DENIED:

Transocean Air Lines application to fly passengers and baggage between Brussels, Belgium, and New York and from Munich, Germany, to New York on contract with Intergovernmental Committee for European Migration.

Petition of city and chamber of commerce of Tucumcari, N. M., for reconsideration of the Pioneer Air Lines' application for authority to suspend service temporarily at Tucumcari.

Joint petition of cities of Del Rio, Eagle Pass, and Uvalde, Tex., for temporary exemption or change of service pattern authorizing Trans-Texas Airways to serve Kerrville and Crystal City-Carizzo Springs, Tex.

Ozark Airlines from certain provision of the Civil Aeronautics Act to enable the carrier to continue carrying persons, property and mail into Columbia, Mo.

PAA Briefs Salesmen via TV

Using closed-circuit television, Pan American World Airways vice president-traffic and sales Willis G. Lipscomb recently told 2,500 travel agents in 20 different cities that 1954 business would be at least 10% higher than 1953's. Lipscomb said this was the margin by which PAA is increasing its sales quota this year. According to the airline, the sales talk marked the first closed-circuit TV use in transportation history.

Eastern Pilots Fight Authority Restrictions

Eastern Air Lines pilots formally objected last week to amendments to the Civil Air Regulations that would restrict a pilot's authority while flying all four-engine aircraft requiring flight engineers.

In a resolution distributed to Civil Aeronautics Board members, Civil Aeronautics Administrator Fred B. Lee and Eastern's management, the pilots said the new provisions of the regulations hold the pilot in command of the ship "responsible for the operation and safety of the airplane" and at the same time make it illegal for him to operate some of the devices and equipment necessary to discharge this responsibility except in "emergency conditions only."

▶ **Emergency Rule**—The new provisions state: "On flights requiring a flight engineer, at least one other flight crew member shall be sufficiently qualified, so that in the event of illness or other incapacity, emergency coverage can be provided for that function for the safe completion of the flight. A pilot need not hold a flight engineer certificate to function in the capacity of a flight engineer for emergency conditions only."

A second provision says: "No individual shall serve in the flight crew as a flight engineer unless he has in his personal possession while so serving a valid flight engineer certificate issued by the Administrator."

Eastern pilots say they are unwilling and will not accept responsibility for the operation and safety of an airplane unless they are duly authorized to operate any and all components, devices and equipment on the airplane under any and all conditions "with no restrictions whatsoever."

▶ **Action Asked**—They add that it generally is recognized that it requires a greater degree of qualification to function adequately under emergency conditions than it does to function adequately under routine conditions, thereby making inconsistent and unrealistic the provision, "A pilot need not hold a flight engineer certificate to function in the capacity of a flight engineer for emergency conditions only."

EAL's pilots are calling for immediate action by authorities to remove all restrictions on the right of operation by a pilot. Unless this is done, they charge, "Eastern Air Lines must provide an opportunity for the appropriate group of pilots to meet the provisions of the

Civil Air Regulations as applicable for a flight engineer's certificate as a condition of continuing the operation of this equipment."

The new provisions were to go into effect Oct. 1 but, because of various pressures brought to bear, the Board has postponed them twice. CAB says it will not postpone the effective date again.

Eastern pilots affected are those flying the airline's 55 Lockheed Constellations.

Senators Urge Action On Nonskeds, Locals

Senate Small Business Committee has called for federal action to improve the position of nonscheduled and local service airlines.

The committee consistently has criticized Civil Aeronautics Board for failure to act on behalf of nonskeds over a three-year period. This is the first time it has touched the problems of local service lines.

The committee declares in its annual report that "prompt action is imperative" regarding nonskeds if the matter "is not to become moot by the untimely demise of the airlines concerned."

On local service lines, the committee observed: "It has long been evident that they could not continue to receive so large a subsidy from the taxpayers, nor do most of them wish to do so. But, ironically, the efforts of the feeders to become self-supporting sometimes seemed handicapped by the policies of the federal government, which would gain the most by their financial self-sufficiency."

CAB's refusal to permit Pioneer Airlines to replace DC-3s with 2-0-2s was cited as an example.

SHORTLINES

► **Aeroflot's** top official, Marshal E. F. Sjavoronkov, is on tour through Europe to compare airline passenger services. The Russian airline chief's itinerary was scheduled to take him to Helsinki, Finland, and Stockholm, Sweden, Paris and several points in Switzerland. The Russians are reported to have initiated the tour.

► **Allegheny Airlines** reports that over the last five years it has flown 869,492 passengers more than 125 million passenger-miles and carried more than 270,000 ton-miles of mail along with 590,000 ton-miles of air express, registering a perfect safety record for all operations.

► **British Overseas Airways Corp.** round-the-world tourist-class flights via all-British Commonwealth airlines will begin Apr. 1 . . . BOAC will begin weekly tourist-class service on the London-Sydney "Kangaroo Route" Apr. 3 in conjunction with Qantas Empire Airways.

► **Flying Tiger Line** has concluded an interline agreement with Japan Air Lines whereby Tiger flights at San Francisco will connect with the twice-weekly San Francisco-Tokyo schedules of JAL. Combination rates of Tiger and JAL will apply on shipments moving over the systems of the two carriers.

How UAL Speeds Phone Reservations

United Air Lines phone reservations room in the recently opened East Side Airlines Terminal, N. Y. C., has slotted partitions containing conveyor belts in front of sales agents. Ticket orders are carried on belts to a central station where they are phoned in blocks or five or more to United's payload control group at Denver, Colo.

► **Japan Air Lines** reports advance reservations for its trans-Pacific tourist service, scheduled to begin Apr. 1, have been so heavy it has scheduled extra flights for the month of April.

► **KLM Royal Dutch Airlines** has opened a new sales office in San Francisco to cover the territory of northern California, Oregon, Washington, British Columbia and Hawaii.

► **National Airlines** is recording the greatest north-south passenger flow in its history so far this year, with revenue passenger-miles flown in February up 16% over the same month last year and a system increase of 8% over January of this year.

► **Northwest Orient Airlines** will inaugurate its DC-6B tourist service across U. S. to Hawaii, Alaska and the Orient Apr. 1.

► **Pan American World Airways** has established a cargo reservations department for handling airfreight on the same reservations procedure used in booking passengers at all sales offices . . . PAA's Atlantic Division transported 543,068 passengers during 1953.

► **Pan American-Grace Airways** has added another tourist flight Panama-Colombia-Ecuador-Peru as a result of increased traffic in these areas.

► **Sabena Belgian Airlines** has taken delivery on its eighth DC-6B, bringing its fleet of four-engine aircraft to a total of 20. The carrier is scheduled to receive two DC-6A cargo planes sometime this summer, with another DC-6B slated for delivery in 1955.

► **Scandinavian Airlines System** has concluded an interline agreement with American, United and Northwest Orient Airlines whereby Europe-bound SAS passengers can begin their trip in Chicago, Detroit or Minneapolis.

► **Seaboard & Western Airlines** has logged more than 5,000 trans-Atlantic crossings since start of operations May 10, 1947.

► **Trans World Airlines** recorded an increase of 9.4% in revenue passenger-miles over its domestic routes for the first week of March over the same period for last year. TWA also had the best February in its history, with domestic passenger-miles totaling 149.8 million against 147.8 million for February 1952.

► **United Air Lines** established a new record for revenue passenger-miles flown in February, setting a mark of 187,212,000 miles, 10% above the 1953 total.

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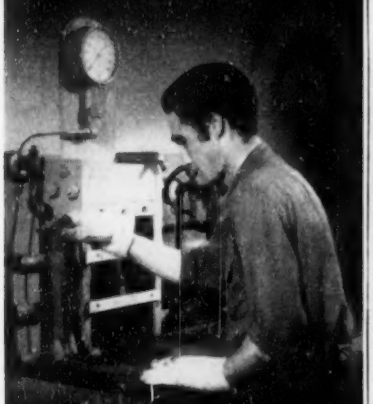

Keeps STILLMAN Ahead in RUBBER PROGRESS

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Airline Subsidy

- **Court ruling will leave impact on air operators.**
- **Decision is seen as clear warning to cut payments.**

Cold economic realities are beginning to emerge from confusion touched off by the Supreme Court's decision that airlines must use domestic profits to offset subsidy requirements of international operations.

These realities will leave their practical impact among air transport operators hit by the ruling (AVIATION WEEK Feb. 15, p. 87).

▶ **Far-Reaching Implications**—When the Federal Court of Appeals directed Civil Aeronautics Board to consider all income of an airline in determining airmail rates, far-reaching implications throughout the air transport industry were regarded as likely (AVIATION WEEK May 25, 1953, p. 78).

A unanimous Supreme Court decision upheld the Federal Court of Appeals, sustaining the Post Office position and administering CAB its first defeat in the highest court.

Based on this court determination, the full House of Representatives voted but $40 million for mail-pay subsidies, instead of the $73 million requested by the Administration for fiscal 1955.

It is reported that the House action was directed primarily at international airlines, heavily dependent upon subsidy mail pay support.

The House action appears rash, because the $33-million cut is not related to any projected savings by profits offset from domestic airline operations or other activities. Unless this cut is restored by the Senate and accepted in compromise by the House, continued U.S. international air services clearly are in jeopardy. Of course, subsequent deficiency appropriations may be sought and obtained, but the House in the past has discouraged such maneuvers.

▶ **Clear Warning**—The implication is quite clear that the mood of Congress is to question and cut all airline subsidies. The current House action is a clear warning to CAB to do likewise at every opportunity.

The Board is not unmindful of this admonition. In recommending to the President that he approve the proposed Eastern Air Lines acquisition of Colonial Airlines, CAB evidently was willing to overlook a slight detail of alleged control in order to rid itself of an annual $1-million subsidy drain inherent in the independent operation of Colonial.

The White House, however, felt dif-

ferently and insisted that the letter of the law pertaining to airline acquisitions be strictly observed (AVIATION WEEK Mar. 8, p. 51). This places the Board squarely in the middle.

And Colonial's continued independent operation probably will require even greater subsidy support. Any new acquisition proposal will take some time before it can emerge through the procedural mill.

▶ **Delta-C&S Dilemma**—Delta-C&S Air-Lines, directly involved in the Supreme Court action by inheriting the problem when it absorbed Chicago & Southern, is in a dilemma as to the net effect of the consequences. It was in a mail rate proceeding covering the overseas routes of C&S where CAB refused to heed the Post Office's request to offset mail subsidy for the International Division by $654,000, regarded as excessive earnings by its domestic operations.

In its recent financial report covering results for the period ended Dec. 31, 1953, the Delta management calls attention to the Supreme Court action but notes: "The amount of the company's liability will not be known until the CAB interprets the mandate of the court and determines the company's mail pay need for the period in question."

▶ **Problems**—Interesting problems are posed to CAB and the carrier. For example, in implementing the Supreme Court action if the Board directs Delta to return the $654,000, as seems probable, how will the airline absorb this?

This alleged excessive mail pay covers the 1946-1950 period of Chicago & Southern's existence. It would appear difficult to open and amend tax returns for that period at this late date.

If the mail pay reduction could be applied to the back period, about half of the amount would be cushioned by tax credits. However, if any reduction in mail pay is taken into 1953 accounts of Delta, it will come at a time when the airline may not have any offsetting tax credits. For the six months ended Dec. 31, a net operating loss of $442,188 was reported. The company's fiscal year ends June 30.

▶ **Routes in Jeopardy**—With a compulsion to reduce mail pay subsidies, the Board may seek every available avenue to accomplish this purpose. This could, for example, expose Northwest Orient Airlines' international routes to some jeopardy.

WAL Reports Profits

Western Air Lines reports net income of $1,184,864 for 1953, a drop of $47,250 from the previous year's $1,232,114. Total operating revenues increased 23% to a record $22,876,797, but operating expenses climbed 29% to $20,385,466.

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SUCH A "MAN" IS ON YOUR PAYROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.

McGRAW-HILL PUBLICATIONS

News Sidelights

Boeing, looking for a name for its new Model 707 jet liner, is somewhat sorry it used the obviously appropriate Stratojet for the B-47. One possibility under consideration is revival of the name Stratoliner. A company wit suggests that since the 707 is going to have so many uses—both military and commercial—it be named Strato-Various.

Ed Heinemann comes up with these statistics on the Douglas F4D Skyray: Actual horsepower with afterburner on is 22,000—equivalent to the shaft hp. of a 26,000-ton, 628-ft. ship. Cooling capacity of the refrigeration system is equivalent to what it takes to freeze 176,000 one-inch ice cubes from 70-deg. water in one day. Power generated by the electrical system is equal to the power used by 20 average homes. The electrical system has approximately 750 radio tubes and 3½ miles of wiring.

J. H. Kindelberger reports that North American Aviation's backlog now stands at $1,108 million. Another $500 million in contracts is in process of negotiation.

Charles Lindbergh is among those who have been to Seattle to look at Boeing's jet transport prototype. Observers say the visit of Lindbergh and Juan Trippe for Pan American was almost as hush-hush as the Model 707 itself. Lindbergh also is reported to have visited de Havilland, builder of the British Comet jet liner, on a civil transport mission. Others who have visited the Boeing project include Ralph Damon of TWA, C. R. Smith of American Airlines, W. A. Patterson of United Air Lines and Gen. Curtis LeMay, Strategic Air Command boss.

Western Air Lines, which operates the only scheduled air service to Palm Springs, Calif., reports that President Eisenhower's recent visit there resulted in shattering all air traffic records at the Palm Springs Airport.

United Air Lines stewardesses were assigned on temporary duty to Tokyo to assist with training of stewardesses for Japan Air Lines.

American Airlines is considering a change in the fire extinguishing system on its DC-7s.

According to a report filed with Securities & Exchange Commission, one of the largest single stockholders of Ryan Aeronautical Co. is Emtor, Inc., a new investment company. Head of the company is Robert A. Harker, partner of the Los Angeles brokerage firm of Harker & Co. Emtor holds about 20% of the outstanding Ryan shares. It was reported that the change in ownership is only technical since the shares formerly were held by individuals now comprising shareholders of Emtor, Inc.

Gen. Curtis LeMay recently flew the B-52 Stratofortress for the first time at Boeing Field, Seattle.

Federal government has paid Los Angeles County $1,285,000 for Palmdale Airport, where North American, Lockheed and Northrop are building flight test facilities.

Four North American Aviation F-86H fighter-bombers powered with General Electric J73s are being put through test trials at Edwards AFB.

Alcohol-water injection scheme for General Electric J47-25 jets on the Boeing B-47 is providing up to 25% more thrust for each engine at takeoff. Installation is expected to make unnecessary the use of rocket-assist units, thus eliminating danger of dropped underbelly "horsecollar" bottle cluster colliding with aft fuselage or tail. Tests also have involved combined use of injection and Rato to evaluate takeoff potential.

Lockheed F-104's recent flight at Edwards AFB was only a trial takeoff procedure in which craft was off ground for only about one mile.

AVIATION CALENDAR

Mar. 22-25—Institute of Radio Engineers, national convention, Waldorf-Astoria Hotel and Kingsbridge Armory, New York.

Mar. 24-Apr. 1—American Chemical Society, 125th national meeting, Kansas City, Mo. Petroleum Chemistry Division will discuss fuels for gas turbines and turbojets.

Mar. 29-31—Aero Medical Assn., 25th annual meeting, Statler Hotel, Washington.

Apr. 12—Society of Automotive Engineers, second annual Aeronautic Production Forum, Hotel Statler, New York.

Apr. 14—National Advisory Committee for Aeronautics, symposium on helicopter research for American Helicopter Society, Langley Field, Va.

Apr. 14-16—Society for Experimental Stress Analysis, spring meeting, Netherlands Plaza Hotel, Cincinnati.

Apr. 19-20—Symposium on automatic production of electronic equipment, sponsored by Stanford Research Institute and AF, Fairmont Hotel, San Francisco.

Apr. 21-23—Air Line Pilots Assn., second annual Air Safety Forum, Chicago.

Apr. 22-23—Joint meeting of Radio Technical Commission for Aeronautics, Franklin Institute Laboratories, Institute of the Aeronautical Sciences (Philadelphia Section) and Institute of Radio Engineers (Philadelphia Section), Franklin Institute, Philadelphia.

Apr. 22-23—American Institute of Electrical Engineers, conference on feedback control, Claridge Hotel, Atlantic City, N. J.

Apr. 29-30—American Society of Tool Engineers, 10th biennial industrial exposition, Convention Center, Philadelphia.

May 4-6—1954 Electronic Components Symposium, Department of Interior Auditorium, Washington, D. C.

May 5-7—Third International Aviation Trade Show, managed by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 6-8—Institute of the Aeronautical Sciences, first annual West Coast Industry-Faculty Conference and fourth annual West Coast Student Conference, Los Angeles.

May 7—Ohio State University, first annual Conference for Engineers, including aeronautical engineering, Columbus, Ohio.

May 16-19—American Association of Airport Executives, national convention, Louisville, Ky.

May 20—Women's National Aeronautic Assn., 1954 Skylady Derby for stock model aircraft of 300 hp. or less, Raton, N. M. to Kansas City, Mo.

May 21-22—Operations Research Society of America, second annual meeting, Edgewater Beach Hotel, Chicago.

May 31-June 11—Canadian International Trade Fair, to be held in conjunction with the National Air Show and Canada's Aviation Day, Toronto.

June 5-12—Philadelphia Junior Chamber of Commerce, second annual Transcontinental Air Cruise for stock model aircraft of 300 hp. and less, Philadelphia-Palm Springs, Calif.

June 21-24—Institute of the Aeronautical Sciences, annual summer meeting, IAS Building, Los Angeles.

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The British Are Coming!

Where's Our Ocean Cargo Line?

The five members of Civil Aeronautics Board again have before them an opportunity to help recapture American trans-Atlantic air cargo leadership.

A Board examiner has found that public convenience and necessity requires an all-cargo service between our East Coast and western Europe.

The same examiner has found that of six applicants, Seaboard & Western Airlines is most fit, willing and able to render such service, and urges a five-year certificate.

Earlier, one of the Board's own counsel reached similar conclusions in a separate report.

Seaboard filed its original application for trans-Atlantic all-cargo routes in July 1947, almost seven years ago. The case has been hamstrung ever since.

There was one decision by CAB. It denied certificates to Seaboard and other applicants. Seaboard and Transocean Airlines then petitioned for reconsideration. The board did reopen the case for rehearing in June 1952, but it permitted three other applicants to enter the proceeding, with up-to-date information and data.

Meanwhile, in the seven long years the U. S. has frittered away its trans-Atlantic airfreight supremacy. Foreign-flag lines have been busy, and successful.

An editorial here July 7, 1952, told how successful. In testimony that CAB apparently ignored, Seaboard reported that in 1947 U. S. certificated carriers lifted 72.7% of the total air cargo across the North Atlantic, while foreign lines carried 27.3%. In 1949, we flew 53.7%, the foreigners 46.3. In 1951 it was 36.4% for us and 63.6% for foreign lines.

Just one day before Herbert Bryan's examiner report was served urging Seaboard's certification for all-cargo service, another Board examiner served a report recommending that the Board grant a British government-approved application filed by Airwork, Ltd., for an unsubsidized, all-cargo service between Great Britain and the U. S. Official Washington believes that under this government's air agreement with England, the Board will be virtually compelled to grant Airwork's certificate.

It seems inconceivable that the Board would grant a certificate to a foreign all-cargo air carrier before issuing the same right to an American independent, unsubsidized all-cargo company, whose approval has been withheld for so many years.

It also is inconceivable that the Board would grant such rights to a British company and deny them to an American firm. In such case, says Examiner Bryan, "the Board would have to assume the anomalous position of finding that public interest factors require a permit for a foreign air carrier while finding that similar conditions do not require a certificate for a domestic air carrier to provide a like service."

The examiner sees in the near future a trans-Atlantic airfreight potential of about 60 to 65 million pounds a year, of which 35 to 40 million pounds per year would still remain to be developed by Seaboard after PAA, TWA and the other IATA members had stepped up their efforts to meet the increased competition.

The world's air cargo market is expanding. With constant technical improvements and more efficient aircraft, air will win more and more freight from the ships.

"Certification of an all-cargo carrier would stimulate the operation of all-cargo aircraft not only by a new carrier but also by existing carriers and would redound to the interest of the national defense," the examiner says.

The Department of Defense in this proceeding strongly urged expansion of civilian air cargo service to Europe and the Middle East, without favoring any carrier or carriers, pointing out that existing U. S. carriers on several occasions had been unable to handle expeditiously trans-Atlantic shipments of vital military materials.

Defense Department officials also cited the military value of the largest possible fleets, in being, of the most modern long-range aircraft, skilled personnel and facilities that can be converted quickly to war uses.

The Port of New York Authority reported an urgent need for Atlantic all-cargo services. It added that in 1949, 81% of the total scheduled trans-Atlantic all-cargo flights were operated by U. S.-flag carriers, while in 1952 this dropped to 30%.

"From the foregoing facts and all the evidence of record, it must be concluded that the benefits which would accrue to the users and the national defense outweigh the adverse diversional effects which Pan American and TWA would experience from the operation of an all-cargo trans-Atlantic service . . ." the examiner decided.

In determining which of the six all-cargo applicants was most fit, willing and able, the examiner studied equipment, financial ability to inaugurate the service, and past violations of the act. "Seaboard appears to be the most able of all the applicants to develop the trans-Atlantic air cargo potential," he decided.

Certainly, Seaboard has an outstanding record in commercial service, a reputation for quick and economical transportation for the military services, including the Berlin and Korean airlifts. It enjoys a reputation in air transportation circles as a clean, aggressive and efficient operation. It has never sought or obtained government subsidies. It has a precise knowledge of its airfreight costs—an impossibility for combination passenger, freight, express and mail carriers—and it has operated in black ink for much of its history, even without subsidy.

Seaboard has flown airfreight across the Atlantic since May 1947. It is a going concern, as the examiner pointed out, with experienced personnel familiar with the operating and sales problems to be encountered in developing the market. Its safety record is excellent. It has on order four Super Constellations costing about $8 million, which it will begin receiving this year. Its business record to date has won it a $1.4-million credit from the Chase National Bank. It sponsors a fellowship at Columbia University for research in international air freight. It has fought hard to get what it has and it expects to remain a permanent member of the air transport industry.

We believe the examiner is right in urging that an American freight carrier be given a chance to show what it can do in this market for at least five years, without subsidy. This is free enterprise. We also believe that Seaboard is the airline to try it.

—Robert H. Wood

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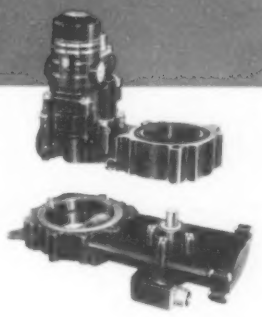

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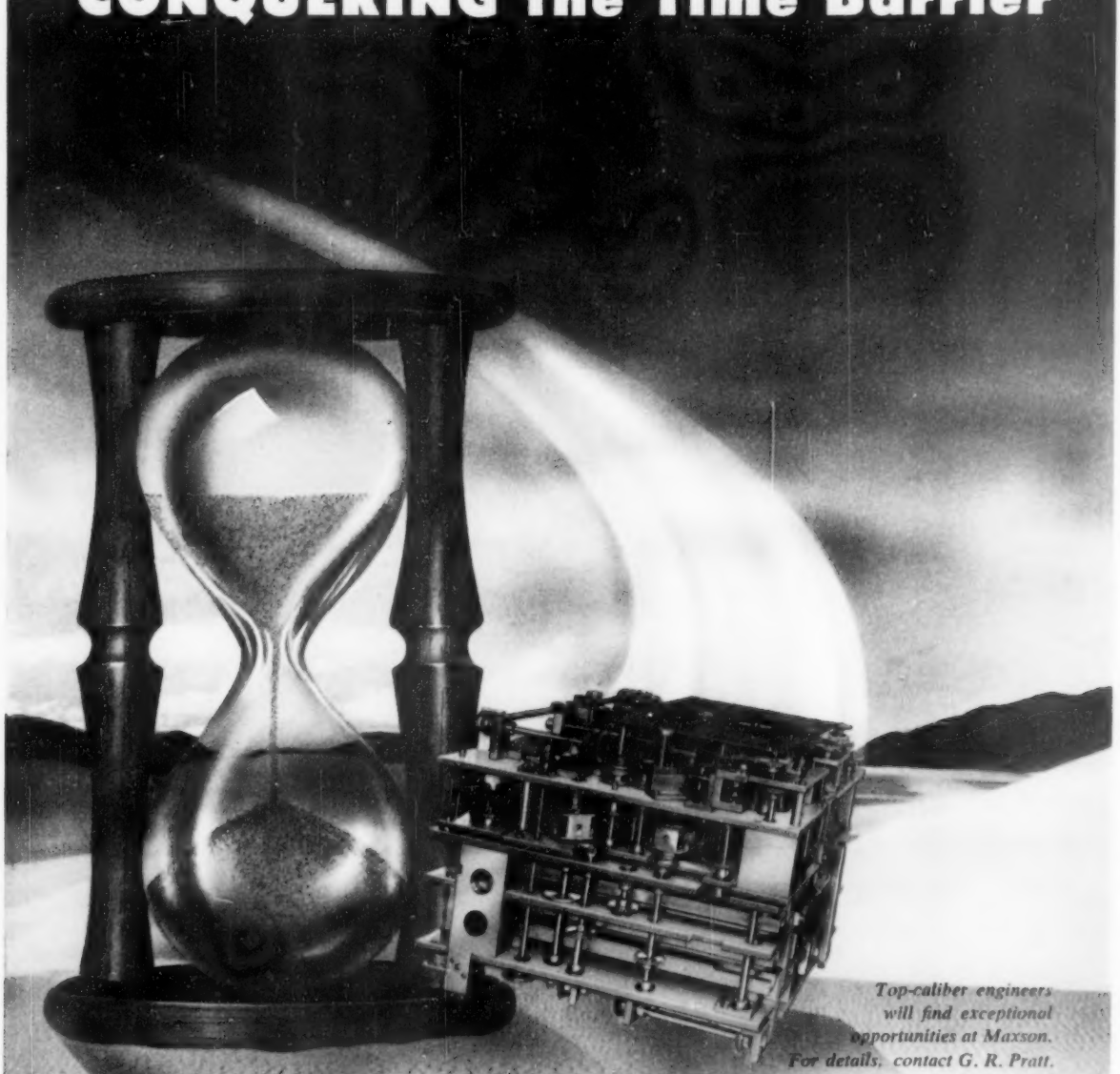

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